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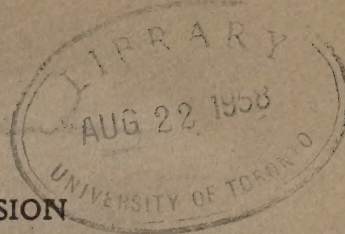
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Ontario Hydro-Electric
Inquiry Commission
1922-1924

(COPY FOR MR. J. ALLAN ROSS)

Engineering data



HYDRO-ELECTRIC POWER COMMISSION
OF ONTARIO



COPY OF
COMMENTS ON EVIDENCE GIVEN BEFORE THE COMMISSION
BY CONTRACTORS ON MAY 18TH, 22ND AND 23RD, 1923,
AND OF
ANSWERS TO QUESTIONS ITEMIZED IN
MR. BOWER'S LETTER TO MR. POPE OF JUNE 14TH, 1923.

TRANSCRIBED AUGUST 7TH, 1923



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COMMENTS ON EVIDENCE GIVEN BEFORE THE COMMISSION
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ANSWERS TO QUESTIONS ITEMIZED IN
MR. BOWER'S LETTER TO MR. POPE OF JUNE 14th, 1923.

HYDRO-ELECTRIC INVESTIGATION

COMMENTS ON EVIDENCE GIVEN BEFORE THE COMMISSION

BY CONTRACTORS ON MAY 18th, 22nd and 23rd, 1923.

Prefatory Note

CHAIRMAN - If you had been in the place of the Commission and had to
This document is an exact transcription of the text of an undated
document prepared by Mr. H. G. Acres under the title "Comments on Evidence
given before the Commission by Contractors on May 18th, 22nd and 23rd, 1923".
The original illustrations have been re-drawn and copied with the aid of the
camera. The transcription consists of fifty-nine pages of text, together
with seventeen appendices.

This is precisely the procedure followed by the Commission, as evidenced
In addition, this document contains an exact transcription of a memoran-
dum entitled "Answers to Questions itemized in Mr. Bower's Letter to Mr. Pope
of June 14th, 1923", being the questions and answers in full in numerical
order. The paging herein is marked Q-1 to Q-8.

Practically without exception, all of the important positions in this
organization were filled by men who were specialists, either by virtue of
engineering or actual construction experience. In the development of Niagara
structures to me under date of August 2nd, 1923, from the duplicate copies
furnished to me by Mr. Pope.

These transcriptions have been made following Mr. Bower's letter of in-
had spent the greater part of their business lives on power construction work
of a heavier and more extensive character than any other work they
were in business in 1916 and 1917, or since. These men, Consulting Engineer.
Toronto, August 7th, 1923.

Walter J. Francis
Consulting Engineer.

The men would be in the best of the work of the
organization of the Foundation Company, the Francis & Jones Company, for instance.

Preliminary Note

This document is an exact transcription of the text of an undated document prepared by Mr. H. G. Jones under the title "Comments on Evidence Given before the Commission by Contractors on May 18th, 22nd and 23rd, 1933". The original illustrations have been re-drawn and copied with the aid of the camera. The transcription consists of fifty-nine pages of text, together with seventeen appendices.

In addition, this document contains an exact transcription of a memorandum entitled "Answers to Questions Issued in Mr. Power's Letter to Mr. Pope of June 14th, 1933", being the questions and answers in full in numerical order. The paging herein is marked 9-1 to 9-8.

These transcriptions have been made following Mr. Power's letter of instructions to me under date of August 2nd, 1933, from the duplicate copies furnished to me by Mr. Pope.

Toronto, August 7th, 1933.

Consulting Engineer.

Walter R. Jones

HYDRO-ELECTRIC INQUIRY COMMISSION

COMMENTS ON EVIDENCE GIVEN BEFORE THE COMMISSION
BY CONTRACTORS ON MAY 16th, 22nd and 23rd, 1923.

PAGE 5278:

CHAIRMAN - If you had been in the place of the Commission and had to have the work done, how would you have gone about the organization of your forces to do it?

MR. LARKIN - I would have split the organization up under proper headings; the engineering first, then construction, then operating. I would have had probably three or four divisions, and then I would have endeavored to secure, as a result of investigation, the best men from the standpoint of their reputation and performance that I could get to head these departments. That is what a contractor would do in a big undertaking.

This is precisely the procedure followed by the Commission, as evidenced by the organization charts in FR, chapter F, and also as outlined in Appendix 4 of my report of January 10th, 1918.

Practically without exception, all of the important positions in this organization were filled by men who were specialists, either by virtue of engineering or actual construction experience, in the development of Niagara power. Furthermore, Works Engineer Goodwin and General Superintendent Angell had spent the greater part of their business lives on power construction work of a heavier and more extensive character than any Canadian contractors who were in business in 1916 and 1917, or since. These men, therefore, had a following of experienced subordinates fully as extensive and competent as the organizations of the Foundation Company and Fraser-Bruce Company. For instance,

the superintendent on Division No. 1, the superintendent on Division No. 4, the master mechanic, the general repair foreman, the general track foreman, had all worked for Superintendent Angell, and with each other, for years previous to coming on this work. One important exception to this rule was Superintendent Scriven who had charge of Divisions Nos. 2 and 3, and he was specially recommended to Mr. Angell by myself. Mr. Scriven, being a practical contractor of many years' experience, also brought with him on to the work a considerable number of men who had worked for years with him and with each other.

Under the circumstances, not much weight can be assigned to the argument that the construction force was an organization patched up in a loose, haphazard manner.

Precisely the same argument applies to the engineering organization, and cannot be summarized better than by a letter written to Premier Drury by Brigadier-General Mitchell, copy of which is attached hereto - Appendix 1.

Page 5283:

MR. HANEY: Here is the top layer of earth (referring to FR, chapter H, page 131). There is 9,000,000 cubic yards. Would it be advisable to do the work as shown on this profile or keep right on the surface and use a number of shovels and get the earth off so that the rock would be reached as quickly as possible; or do you think it would be more practicable to do the work as outlined by the black lines; that is, working in short sections? We want some man to tell us the method a practical man would have followed.

MR. LADDIN - Of course, the best would be to get this earth off the top.

There is an implied criticism in Mr. Haney's question, having to do with

the appearance on the profile mentioned, that the excavation work was started here and there along the canal in a more or less haphazard manner, and without the appearance of a definite working program.

Bowman's Gully was over 80 feet deep where it crossed the line of the canal and extended eastward to the Niagara River and westward for a distance of about 2,000 feet from the centre line of the canal. This gully, together with the two main line tracks of the Grand Trunk, and the single track of the Michigan Central, formed an impassable barrier to through communication at the start of the work. Being as deep as it was, Bowman's Gully was also naturally the low drainage point for both earth and rock for more than half of the total length of the canal. Had it been possible to follow the originally contemplated scheme of procedure, Bowman's Gully would have formed the general sump for all the canal drainage, and when the work was started in 1917 it was the intention to work the excavation plant simultaneously north and south from this point. This intention is quite plainly indicated on the profiles mentioned in Mr. Haney's question above. On these profiles the deeper cuts indicate the work done by the large electric shovels, and the lighter cuts indicate the work done by the railroad type shovels. These latter shovels were engaged either in stripping light overburden or in taking out pilot cuts for the grade of the loading tracks which served the big shovels. One small patch of excavation near mileage 5 on these profiles is the excavation for the abutments of the N. S. & T. railroad bridge, and has no direct relation to the general scheme of earth and rock excavation.

Mr. Larkin's answer to this question is, of course, the only one, but taken in conjunction with the questions and answers on the following page, it is

apparently the idea that the overburden should have been removed complete, either with the big shovels, or preferably with small 70-ton shovels, before touching the rock. Insofar as the operation of the big shovels is concerned, this was impossible because large quantities of crushed rock were needed from the very beginning of operations for road metal and track ballast. Furthermore, in 1918, when No. 2 shovel started working south from the main line of the Grand Trunk, large quantities of excavated rock were absolutely necessary for holding up the soft banks which obtained continuously almost up to Lundy's Lane. Also, in the fall of 1918, when operations commenced on the St. David's disposal area, more rock was needed to anchor the trestles than could actually be spared, on account of more urgent requirements elsewhere. It was, therefore, absolutely necessary to carry on earth and rock excavation work simultaneously.

In the matter of using 70-ton shovels, the experience on this work throughout has been that with the exception of about half a mile each side of the summit at Lundy's Lane, there was no earth bottom anywhere on the canal which would hold up the railroad type shovel at a depth of more than 20 feet below the natural contour. As a matter of fact, at many points between the Grand Trunk and Winery Road, it was found impossible even to take the railroad cut out to the designed grade. The result was that where possible, the grade was elevated, and where this was not possible the excavation was taken out with a small drag-line.

Through this latter section the maximum cut a railroad shovel could safely handle was about 9 feet below the natural surface.

North of Bowman's Gully the use of railroad type shovels in the heavier

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NOTE: The above is a summary of the information received from the various sources mentioned above. It is not intended to be a complete and exhaustive list of all the information received, but rather a summary of the most important information received.

portion of the overburden would have been impracticable, not only on account of soft bottom, but from the standpoint of car service, as the natural slope of the rock surface at this point was such as to make it impossible to pull out loaded trains back towards, and the working conditions of which they

Failing the big shovels as actually used, the only possible method of removing this overburden would have been to use draglines of a size and reach greater than any so far constructed. These machines might have given reasonable service if the material could have been cast, but they would have been an impossible proposition for loading dump cars. The largest dragline now built would not work efficiently in cuts exceeding 50 feet in depth, on account of the steep angle of drag, even at maximum length of boom.

PAGE 5285:

MR. HANEY - On that basis, assuming that at 2,000 yards per day, 25 days, 50,000 yards, and with 10 shovels, 500,000 yards a month, and in 10 months, 5,000,000 yards, leaving 2 months for winter weather; six months in summer on double shift, and get out 6,500,000 yards in the year. I am speaking of the stripping.

MR. LANKIN - Of course, I think that is a fairly rosy estimate.

In connection with the above quoted observations, please note Appendix 2 attached, which covers actual authentic records of the performances of the railroad type shovels under the working conditions assumed by Mr. Haney; namely, 100% efficient train service, competent and efficient shovel operation, first-class mechanical condition of shovels, and overburden of the type encountered in the four miles of route between Station 370, north of the Grand Trunk Railway, and Lundy's Lane. These records cover the operation of railroad type shovels in the top cut only.

1. The first of these is the fact that the Commission has not yet received any information from the Government of the United States regarding the activities of the Committee for the Liberation of the People of the East (CLPE) in the United States. This is a serious matter, as the CLPE is a known and active organization which has been operating in the United States for many years. It is a member of the National Front for the Liberation of China (NFLC) and has been active in recruiting and training Chinese agents for operations in the United States. The Commission is therefore very concerned that the Government of the United States is not providing it with the necessary information to enable it to carry out its duties effectively.

It is a very common mistake to suppose that the only way to get the best results is to use the most powerful weapons. In fact, the most powerful weapons are often the least effective. The best results are often achieved by using the simplest and most direct methods. This is true in all fields of endeavor, and it is especially true in the field of education. The best results are often achieved by using the simplest and most direct methods. This is true in all fields of endeavor, and it is especially true in the field of education.

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It is suggested that the following classification be used:

[illegible]

There is no doubt that the results of the present study are in line with the findings of other studies. The results of the present study are in line with the findings of other studies. The results of the present study are in line with the findings of other studies.

In the case of shovel No. 3, the 10 foot depth was abandoned when it came to a point where about five 20-yard cars of crushed stone had to be placed under the trucks and jack-arms to dig about two 20-yard cars of rock.

These records, and the working conditions of which they furnish evidence, would appear to indicate that Mr. Larkin is correct when he states that a continuous average output of 2,000 yards per day in this material with a railroad type shovel is "a fairly rosy estimate".

PAGE 5286:

MR. HANNEY - The disposal grounds for the Chippawa work were practically all on trestles.

MR. LARKIN - So I believe; I never saw it.

As a matter of fact, out of the total of 9,909,366 yards of earth and rock deposited in the St. Davids and Lundy's Lane disposal areas, only 3,697,180 yards, or 37% of the total, was dumped from trestle. The balance of 6,212,186 yards, or 63% of the total, was dumped from track which was moved out as occasion required, after the dumps had been plowed wing-wide.

The trestles were not used for dumping purposes as long as there were sufficient wing-wide dumps in proper shape to handle trains. The primary function of the trestle dumps was to ensure, as far as possible, uninterrupted dumping facilities while track raising or track shifting was in progress on the wing-wide dumps.

At Lundy's Lane, it was, of course, necessary to construct a certain amount of trestle to provide the necessary dumping height, as there were no side hill

contours similar to those at St. Davids.

The point is that if all the material had been dumped from trestles, it might have been possible, with a great deal of trouble and expense, to use flat cars and Lidgerwood unloaders, for earth only, where the material was of such a nature that it would stay in the cars. This procedure would have been possible by reason of the fact that the dump trestles could have been built on tangents. Under the conditions that actually existed, however, only 39% of the material, representing the dry portion of the canal earth, could have been handled in this way, because the tracks on the wing-wide dumps were never tangents, and did not need to be, as the tracks were swung to follow the most favorable contours and to avoid soft spots in the banks. Under such conditions the alignment of these wing-wide dump tracks was being constantly shifted, and the use of unloading plows would have been utterly impossible.

If anyone were disposed to argue that it would have been in the interest of economy to dump all the material from trestle, it would not be necessary to reply to this contention on the basis of economics, but simply to state that there was neither material or labor available for building them, and even if labor and material had been available, the congestion on the dump areas, resulting from the enormous volume of timber work that would be necessary, would have destroyed the primary function of the disposal areas, which was to absorb the output of the shovels as fast as it could be delivered. Furthermore, the trestles would all have to be parallel to each other, in order to make as full use of the disposal area as possible.

Appendix E attached gives certain information in connection with the trestle

...and the ...

The point is that it will be a good idea to have a list of names of people who are interested in the project.

1. The first step in the process of the investigation is the identification of the problem. This is done by the investigator who is assigned to the case. The investigator will then gather information about the problem and the people involved. This information will be used to determine the cause of the problem and to develop a plan of action.

Believe that it will stay in the same. This procedure will have been passed on

By reason of the fact that the above mentioned could have been built on property.

Information will be given, received, furnished, disclosed, or otherwise made available

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(on 11) has already been reported at the end of the last page.

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of the above steps and the following steps:

wing-wide dump trucks was being constructed in 1941, and the use of unloading

Yours would have been utterly impossible.

It is possible that the above information is not sufficient to determine the exact date of the event.

1. The Government of the United States of America, by and through the Secretary of the Interior, has the honor to acknowledge the receipt of your letter of the 10th day of May, 1906, in relation to the above-captioned matter.

On this occasion the State of Tennessee, the State of Georgia, the State of Alabama, the State of Mississippi, the State of Louisiana, the State of Arkansas, the State of Missouri, the State of Illinois, the State of Indiana, the State of Ohio, the State of Pennsylvania, the State of New York, the State of New Jersey, the State of Delaware, the State of Maryland, the State of Virginia, the State of North Carolina, the State of South Carolina, the State of Florida, the State of Texas, the State of Oklahoma, the State of Kansas, the State of Nebraska, the State of Colorado, the State of Wyoming, the State of Montana, the State of Idaho, the State of Utah, the State of Arizona, the State of Nevada, the State of California, the State of Oregon, the State of Washington, the State of Alaska, and the State of Hawaii.

Subject covered by letter regarding the following item, and over it being an

and William, who had all in common the same old-fashioned

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the highest number of the original group, which was 10,000,000.

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Mississippi as one of the

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construction. These trestles were built as and when required, and during the greater portion of their period of construction their building was governed to a large extent by the availability, or otherwise, of labor and material. Another factor concerning the construction of trestles was the fact that it was necessary to have a certain amount of rock available to dump around the footings where the bents ranged higher than about 30 to 35 feet. If this were not done the sliding of the soft material would have swept the higher bents out and destroyed them. The average height of the trestles at St. Davids was 47 feet.

PAGE 5287:

COPY
MR. HANEY - Of course, the car they use the plow on now, is practically a closed car, the Roger type?

MR. LARKIN - Yes.

MR. HANEY - So that any soupy material might be held there as well as in a dump car?

MR. LARKIN - Yes.

This statement is not correct, the type of car referred to being not in any sense of the word a closed car, as both ends of the car must be free to allow the passage of the plow. The soupy material referred to would have flowed like water out of both ends of these cars and would have made such a mess of the tracks that it would have been impossible to move the train from under the shovel. While the shovels were working in this material it was necessary to keep a gang of about 30 men doing nothing else but clear away the accumulation of slop and droppings. Furthermore, it was necessary to run a flanger over the track system about once a week in order to keep the tracks safe for traffic. On

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1922

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IT IS NOW THE WILL OF THE PEOPLE THAT THE CONSTITUTION BE AMENDED TO PROVIDE THAT THE PRESIDENT OF THE UNITED STATES SHALL BE Elected BY THE PEOPLE OF THE UNITED STATES.

This document is not intended to be used as a guide for the design of a system. It is only a general description of the system and its components. The design of a system is a complex task and requires a detailed understanding of the system and its requirements. The design of a system is a complex task and requires a detailed understanding of the system and its requirements.

the disposal line this accumulated slop finally filled up the drainage ditch on the west-bound track, and it was necessary to put in a dragline to clear it out. All this happened with dump cars having absolutely tight ends, and side doors fitting as tight as it was possible to make them.

If open-ended cars had been used, it can be stated without any exaggeration whatever that not a yard of this soupy material would ever have reached the St. Davids disposal area.

In Appendix 4 attached will be found some further discussion having to do with the handling of this material with long trains and dumping with a Lidgerwood unloader.

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PAGE 5297:

MR. GREGORY - Was there much soupy material?

MR. FRANCIS - The worst I ever saw. They could not build the sides without rip-rapping with rock.

MR. HANNEY - That was due more particularly to the fact that they used large shovels. If they used smaller shovels they could have stepped down and would not have had to lift 60 feet.

The soupy material extended for four miles along the route of the canal from Station 370, north of the Grand Trunk bridge, southward to Station 170, just north of Lundy's Lane. The yardage involved was 5,885,388, or about 61% of the total yardage of overburden removed from the canal. In addition to this "soup" there was treacherous "gumbo" on the south side of Lundy's Lane, where piling was needed to hold the loading tracks for about 2,000 feet.

The necessity for rip-rapping the sides had nothing whatever to do with the size or type of shovel used, as the material was of such a nature, and the

ground water conditions were such that the banks were not only unstable, but constantly sliding, if left unsupported. The bank would have held up for the first bench, which condition was proved by the fact that the banks of the pilot cuts and of the railroad cuts usually held up satisfactorily. In some places the second bench would probably have held, but in most places it would have slid out and buried the shovel. The completion throughout of the second bench would have seen the final finish of the railroad type of shovel, for two reasons; first, because, lacking all other untoward conditions, the shovels would have dropped out of sight in the soft bottom; and second, because, under such conditions, these shovels would have at least 20 foot banks above them which would not hold under any conditions, unless heavily surcharged with rip-rap, and under the conditions assumed it would manifestly be impossible to rip-rap these 20 foot slopes. The only condition that made rip-rap possible was the fact that the big shovels worked from rock and took all the overburden out to a finished slope in one bench, thus making it possible to dump rip-rap in its final permanent position. If these big shovels had not been used so as to permit the placing of rip-rap as above described, the removal of the overburden between the Grand Trunk bridge and Lundy's Lane would have been impossible, and the scheme as a whole would have been a complete failure as a result.

The above discussion, furthermore, takes no cognizance of the fact that the service tracks on the slopes of this "scup" in the lower benches of this cut would have had to carry heavy trains on grades of 1% or more. This one consideration was, in itself, sufficient to place entirely beyond the range of possibility any question of using railroad type shovels for the removal of the whole

of the overburden in this section of the canal. In Appendix E attached will be found some further general discussion under this head, having to do principally with the conditions governing the choice of suitable plant for the work.

In Appendix 6 herewith is also shown a diagram outlining the procedure which would be necessary in order to remove the overburden in a typical 72 foot dry cut with railroad type shovels.

In preparing this diagram it has been assumed that the overburden is entirely dry and self supporting, so that the shovel can take out any depth of bench, and work against any height of face, within its loading range. On this basis, the 72 foot cut in question is shown to be taken out in three main benches, with the loading tracks dropping down in 9 foot steps. This diagram has no meaning at all as related to the conditions which actually obtained in the section of the canal under discussion, as it would not, under any circumstances, have been possible for the railroad type shovel to get down to the level of the first bench shown. As a matter of fact, what this diagram is meant to show is the minimum number of cuts which a railroad type shovel would be required to take, even under ideal conditions as to quality of material, and the enormous amount of moving back and track shifting which such a scheme of procedure would entail.

Flat cars with Lidgerwood unloaders are being used at the present time for disposal purposes on the Ship Canal. This procedure was adopted as a last resort by reason of the fact that the heavy clay which is being excavated will not clear the side doors of a 16-yard dump car. There was no such difficulty on

the Queenston-Chippawa work with the 20-yard cars, as this feature of the situation was foreseen when the cars were being purchased, and one of the deciding factors in favor of the Western car, as against the K. & J., was the fact that the side doors on the Western cars had a little wider dump opening. The consequence was that even with the huge blocks of solid clay which were taken out with the 8-yard dippers, in the section south of Landy's lane, there was no trouble in getting these fragments to clear the doors.

The contractor himself (Mr. Johnston Porter) states that ordinarily the Lidgerwood unloader has no utility whatever on a disposal area, as compared with air operated side dumping cars.

There is some further discussion of this phase of the situation in Appendix 4 attached.

PAGE 5289:

MR. HANBY - Aside from the question of wages, was the efficiency of the steam shovel men fairly well maintained?

MR. LARKIN - The actual operators, yes.

This condition also obtained on the Queenston-Chippawa work, for the simple reason that there were only about 30 to 40 shovel runners on the whole work. Such being the case, it was possible to obtain picked men and exercise close supervision over them. Taken all in all, there was never a more efficient and competent aggregation of shovel runners anywhere, but they were only 30 or 40 out of a working force ranging from about 3,000 to about 8,000 men.

- 13 -

PAGE 5309:

MR. FRASER - Yes, and labor went up during that job. We started with labor at \$1.50 and it went to \$3.50 per day (between 1915 and 1917).

In 1915 the rate for common labor in the Niagara Peninsula was \$2.00 to \$2.25 per day. When this work was started in the early spring of 1917, the prevailing rate for common labor was about \$2.50 per day. In the 1917 estimate for the 10,000 second-foot canal, common labor was figured at \$3.50 per day. This was considered a reasonable forecast at the time, as the war had then been in progress for three years, and the conditions which began to develop in the latter part of 1918, and culminated in 1920, were not conceived of or imagined.

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PAGE 5311:

MR. GREGORY - Then, if you had made an estimate in 1917; would you have figured on labor at what it was at that time?

MR. FRASER - Oh, yes.

MR. GREGORY - Making some allowance for additional labor costs?

MR. FRASER - Making some allowance for possible increase.

Any sensible individual would have done the same thing at that time.

In the 1917 estimate for the Niagara work what was considered at that time a very liberal allowance was made for increased material as well as labor costs. When the work started in 1917, common labor was paid \$2.50 per day, and in the estimate was figured at \$3.50 per day. All plant costs were figured at or above the current prices of that date, and a large contingency item was added to cover possible future increases.

PAGE 5316:

MR. HANEY - What was the next job?

MR. FRASER - The next job of this character was the Manitoba Power plant which was started in the fall of 1921 and is not yet quite completed. They are getting power now but the rock excavation and the big dam is still to be completed, and that work is being done within the estimates.

There is no difficulty in doing work within the limits of estimates made in 1921, and our experience on this work is similar to Mr. Fraser's.

PAGE 5316:

MR. HANEY - Anyone making an estimate in 1920 should be well within their price as far as labor is concerned?

MR. FRASER - Yes. In every feature of the cost it has been reduced since 1920.

Mr. Haney's statement is true insofar as labor rates are concerned, and Mr. Fraser's statement is correct insofar as it relates to new work starting in 1920.

There was an 11% increase in labor rates in 1920 over 1919, and no decrease until August of 1921, and the intangible factor of labor inefficiency continued in full force and effect throughout this whole period. As far as other items of cost at Niagara were concerned, the Niagara job got little or no benefit from the easing-off of conditions in the latter part of 1920 and 1921, because practically all of the obligations against the Niagara work had been incurred during the peak price period.

1941

Mr. Ford - How was the work?

Mr. Ford - The last job of this character was the "Hundred" company. It was started in the fall of 1941 and is not yet completed. They are getting power now and the work is being done. It will be completed, and I am sure it will be done by the end of the year.

There is no difficulty in doing work within the limits of resources in 1941, and the experience on this work is similar to the work in 1940.

1941

Mr. Ford - I am sure you will find it difficult to do the work in 1941. I am sure you will find it difficult to do the work in 1941. I am sure you will find it difficult to do the work in 1941.

Mr. Ford - Yes, the work is difficult. It is difficult to do the work in 1941. It is difficult to do the work in 1941. It is difficult to do the work in 1941.

Mr. Ford's statement is that the work is difficult. It is difficult to do the work in 1941. It is difficult to do the work in 1941. It is difficult to do the work in 1941.

1941

There was no difficulty in doing work within the limits of resources in 1941, and the experience on this work is similar to the work in 1940. The work is difficult to do in 1941. It is difficult to do the work in 1941. It is difficult to do the work in 1941.

PAGE 5316:

MR. ROSS - How do you find the efficiency of labor now as compared with before the war; is it getting back to where it was?

MR. FRASER - Oh no, they do not do as much. On the other hand, we are using machinery more than we used it before to save labor.

The condition mentioned by Mr. Fraser began to show on the Niagara work in the latter part of 1918, and became acute during the period from midsummer of 1919 until midsummer of 1921. During this period it was absolutely necessary to resort to unanticipated plant purchases to offset not only the growing inefficiency of labor, but the actual deficiency in the supply.

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PAGE 5317:

MR. CHANNERY - How often do you check the work?

MR. FRASER - Every month.

The same thing was done on the Niagara work, and in addition to the monthly cost reports, there was a report on the direct labor costs for earth, rock and concrete prepared every day.

Under pre-war conditions, and on a piece of work of ordinary magnitude, a monthly cost report enabled a fairly definite determination to be made as to whether estimates were being exceeded or otherwise, and served as a basis to forecast the future cost of the work. On the Niagara work the magnitude of the job alone introduced a multitude of indirect cost items and overheads which could not be seen in their true perspective in a monthly cost report. This was particularly the case on the Niagara work because working conditions were

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The committee consisted of Mr. Thomas J. Ryan, Chairman, and Mr. J. J. Ryan, Secretary. The committee was organized in the latter part of 1937, and began work during the year 1938. At 1939 until midsummer of 1941. During this period it was extremely busy and as a result it was necessary to suspend its work for a period of several months in the summer of 1941. The committee was reorganized in the summer of 1941 and has since that time been working on the project.

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NEW YORK, NOV. 10 (AP) —

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The same thing was done on the other side, and in addition to the

entirely unprecedented, and were not stable from month to month, or even from day to day, so that deductions as to future progress and cost which were made according to pre-war custom, would have been very misleading; this condition, as above mentioned, being due solely to the abnormal conditions created by the war. In this section condensed information was given of the progress of the work.

PAGE 5317:

MR. CHURCH - You have a program?

MR. FRASER - Yes, absolutely. We have a program and we have to sacrifice cost for program every time because time is the big element in a hydro-electric plant.

COPY

The original "program" for the Niagara work is set forth in Appendices 5 and 6 of my report of December 26th, 1917. Due to uncontrollable conditions which have been sufficiently enlarged upon elsewhere, it was impossible to adhere to this pre-arranged schedule, until August of 1920. The schedule of operations laid out in August of 1920 was adhered to within a margin of one month simply because the excavation in the quicksand section was approaching completion by that time, and because an adequate supply of labor began to become available in the early fall of 1920.

The "sacrifice" in the case of this latter program took the form of an increase in the estimated cost for the complete installation of five units to \$43,000,000.00 as per the Stuart and Kerbaugh estimate. This September 1920 schedule involved practically the doing of two years' work in one to make up for the year of unavoidably lost time which occurred between the early fall of 1918 and the early fall of 1920. The recovery of this year of lost time was

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The "concession" in the case of this latter program took the form of an increase in the estimated rate for the complete installation of 1946 which is \$25,000.00 as per the third and fourth estimates. This program was approved by the Board of Directors of the City of New York on May 15, 1946.

necessary for two reasons; first, to meet the anticipated demand for power in the winter of 1921-22, which afterwards transpired exactly as foretold; and second, to obviate a delay of at least 12 months in pouring the concrete lining walls between the Grand Trunk Railway and Montrose, as the large amount of water in this section rendered impossible any idea of leaving the lining walls unfinished and unprotected for a winter season.

PAGE 5318:

MR. GREGORY - If you began a work and planned to have it finished at a certain time, would your object be to get as much of your plant in operation as soon as possible?

MR. FRASER - Always - and on the time feature we have not failed.

From Mr. Fraser's evidence it does not appear that he has ever been called upon to schedule a job for $3\frac{1}{2}$ to 4 years ahead even before the war. Apparently, the biggest job that Mr. Fraser had to schedule during the war period was the La Loutre dam, a less than two-year job which was completed in 1917, before war conditions became really acute.

The above question on the part of the Chairman would indicate a tendency to assume that the conditions which Mr. Fraser is discussing are the same as the conditions under which the work at Niagara had to be carried on. As a matter of fact, Mr. Fraser should have been asked to criticize the program of operations and working schedule set forth in Appendices 5 and 6 of my report of December 26th, 1917, as against his procedure in the case of the La Loutre dam in the same year. The circumstances which prevented this schedule from being made good were abnormal and admittedly unforeseen. The appendices above mentioned afford

sufficient evidence as to whether or not it was the intention to get the "plant in operation as soon as possible".

order issued by the Purchasing Department. In the case of the plant at the

PAGE 5319: on the list. The article was ordered on approximately

MR. HANEY - Your practice is to force your work at the start and not at the finish?

MR. FRASER - Well, of course, there are a lot of small things to do at the end. In the case of the plant at the

This question also carries with it an inference that through negligence or ignorance, there was not sufficient energy put into the start of the work at Niagara, and no consideration is given to the necessarily comprehensive preparatory work required for a work of such magnitude. The references made above to Appendices 5 and 6 of my report of December 26th, 1917, are also applicable in this connection.

Among a multitude of the unavoidably and justifiably unforeseen circumstances that prevented this schedule from being carried out may be mentioned the scarcity and inefficiency of labor, wet ground, defective material, the delay on the railway undercrossings, and the delay in the delivery of the first large order of construction plant, which was not considered serious at the time, but later, in conjunction with many other untoward happenings, had an appreciable influence on the result.

Appendix 7 attached covers a list of construction plant orders which have been selected to illustrate the above point. It is important to note, also, in connection with this list, that the delayed delivery shown in connection with these items took place in spite of all the assistance we could obtain from the

War Industries Board and other Government authorities. It is also to be noted that the "Date of order" on this tabulation is the date shown on the official order issued by the Purchasing Department. In the case of a great many of the items shown on the list, the article was ordered on specifications of the Engineering Department and the manufacturer sometimes got the order several weeks before the official confirming order of the Purchasing Department was issued. For instance, in the case of the large shovel and dump car order given to the Canadian Equipment Company, this was placed about the middle of December, 1916, subject to cancellation in one month. This order was given simply to hold the price, and was confirmed on January 15th, 1917, being the same day that the purchase was authorized by the Commission.

PAGE 5320:

MR. GILBERT - Have you any estimate of the cost of your plant as compared with the total cost of your work?

MR. FRASER - On the Manitoba job, the total cost was \$8,000,000.00. The part that we had cost nearly \$3,500,000.00. That leaves out the permanent equipment and leaves out the cement. We had from \$450,000.00 to \$500,000.00 worth of contractor's plant on the job.

The above question and answer, and the subsequent discussion under the same head, has no significance whatever as related to the items classed as "plant" on this work.

In Appendix 8 attached is a list of items which would cover the "contractor's plant" used on this work, that is, \$9,804,732.00 worth of plant, which was and is to be used to do \$64,781,660.00 worth of construction work. In other words, the cost of the contractor's plant on this work was 15% of the work

accomplished and still to be done. This percentage includes all the abnormal wartime conditions, including exchange, war-tax, extra freight, etc., connected with its purchase, use and final disposition. Under the circumstances, this percentage compares favorably with the 13% to 15% mentioned by Mr. Fraser in connection with the Manitoba Power Company work, which was estimated on, and planted, under comparatively stable conditions.

As a matter of fact, the percentage of plant investment on this work would normally be much less than on any work Mr. Fraser has been connected with, owing to the concentration of large production capacity in single units of plant such as the big shovels, the primary crusher and the dredge "Cyclone". If the Niagara plant equipment had been bought under conditions similar to that of Mr. Fraser's plant, the percentage would have been below 10%, as against Mr. Fraser's 13% to 15%.

PAGE 5322:

MR. HANSEY - If you had four years to do a job, could you do it cheaper than if you had to do it in two years?

MR. FRASER - Yes, if it was a fairly big job, the indirect cost would be less. The indirect cost of a two year job would run 40%, and on a four year job would be much less.

This statement is premised altogether upon the assumption that conditions governing cost and progress remain reasonably normal and constant during the period between the date of the preparation of estimates and working schedule, and the date of final completion of the work. It is quite needless to comment upon the extent to which this condition failed to materialize on the Niagara

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work. Obviously there must be a point at which an extended term of completion balances the reduced overheads, and this point will vary with every job, according to the magnitude and the classes and nature of work involved.

night for the summer; third, because it improved the land faster on the one hand, and the compressed air supply; and, second, because it eliminated

PAGE 5323:

MR. HANNEY - Are the men inclined to shirk their work at night more than they do in the day-time?

MR. FRASER - I do not think it is conscious shirking, the men are not in as good trim at night as they are in the day-time. The conditions are against them. If it is raining and if you have good camps for the men, you can get a good deal done in wet weather during the day-time, but on a wet and stormy night it is almost impossible to get work done.

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What Mr. Fraser says is correct. One outstanding condition under this head, which was met with on the Niagara work, and which possibly did not come very prominently before Mr. Fraser's notice, was the immense traffic in illicit liquor with which this work was surrounded from the time the Wartime Temperance Act went into force until the main body of the construction work was completed in the fall of 1921. This situation was particularly serious on the night shift, and made its influence felt in all phases of the work, including railway operations, injury to plant, bodily injury, and a variety of other ways which constant watchfulness was unable wholly to prevent.

the rest of the night shift, and

PAGE 5323:

MR. HANNEY - If you were not pinched you would not put on a night shift?

MR. FRASER - No, but very often in drilling and rock work it can be done at night so as to keep it ahead.

MR. FRASER - I think it is a very good idea to have a night shift.

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The disadvantages of night shift work were fully realized at the start of the work, and the only regular night shift work contemplated was the rock drilling and channeling operations, which could be done more efficiently at night for two reasons; first, because it improved the load factor on the substation and upon the compressed air supply; and, second, because it eliminated interference with blasting operations, and because a comparatively small force of more or less expert workmen would be required, thus making continuous and efficient supervision possible.

PAGE 5325:

MR. B. A. ROSS - The cost is roughly 5 to 1?

MR. FRASER - All of that.

The above observations were probably wrongly reported by the stenographer.

MR. chapter H, page 98, shows a direct comparison of the relative cost of electric and steam shovels. Electric shovel No. 6 cost \$15,732.00, and steam shovel No. 5, of the same type and make, cost \$10,805.00. The electric shovel therefore cost about 45% more than the steam shovel of the same type.

The tabulation in Appendix 2 attached, shows the comparative costs of the larger sizes of similar types of electric and steam shovels, and indicates that the cost of electric shovels, as compared with steam, is in the ratio of somewhat less than $1\frac{1}{2}$ to 1.

PAGE 5325:

MR. B. A. ROSS - Is the increased efficiency of the electric shovel more than counterbalanced by the increased cost?

MR. FRASER - The investment is too great for us and we never tried one.

The reason Mr. Fraser has never used an electric shovel is because he has never handled a piece of work large enough to justify, in his opinion, the increased cost. As a matter of fact, the use of electric shovels would have been justified on his first contract at the Cedars Development, but as electric shovels were more or less of an innovation in 1915, he probably never gave the matter any consideration at all, either from the economic or practical side.

In Appendix 10 attached are some comparative figures of the economics of similar types of electric and steam shovels operating in earth, together with a direct comparison made in 1921, when the Bucyrus 225-B steam shovel was operating in close proximity to the 225-B electric in both earth and rock, and under fairly similar working conditions, except height of lift. These records are authentic, and show conclusively that the greater efficiency of the electric shovel offsets by a large margin the increased cost of this shovel, as compared with the steam shovel of similar type.

PAGE 5325:

MR. R. A. ROSS - What would you say to the type of steam shovel used by the Hydro?

MR. FRASER - Here is a 65 ton shovel, 2 1/2 yard bucket, that cost \$9,000.00. That was bought in September, 1917; that was a very low price. Electric shovels about the same weight cost \$15,000.00.

An electric shovel of the same type as the Atlantic shovel above referred

THE FOLLOWING is a summary of the results of the survey of the
1949-50 season.

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THE FOLLOWING is a summary of the results of the survey of the
1949-50 season.

The results of the survey of the 1948-49 season were used as a basis of comparison.

to would cost not less than \$30,000.00.

This particular Atlantic shovel was rented in May, 1917 from Stein and Reid, sub-contractors on the Welland Canal. This shovel was rented on account of the impossibility of getting prompt delivery on new equipment, the object being to "force the work at the start" in accordance with the program laid down in Appendices 5 and 6 of my report of December 26th, 1917. Furthermore, this purchase price of \$9,000.00 included 7 - 6 yard dump cars, the owners having got tied up in a coal stripping proposition in New Brunswick, and being in urgent need of working capital. The whole outfit was therefore taken over at a bargain price of \$9,000.00 with all rental payments allowed to date of purchase.

If this shovel had been bought new, at that time, it would have cost not less than \$20,000.00, exclusive of the dump cars which were thrown in with it.

PAGE 5325:

MR. HANNEY - You do not know whether in actual operation a 70-ton electric shovel would take any more earth or swing any oftener than a steam shovel?

MR. FRASER - I do not know.

There is no definite relationship between swing cycle and production when comparing electric and steam shovels. The steam shovel will always swing more times per minute, but on the other hand, the electric shovel will always swing more times per day, per week, or per month.

PAGE 5326:

MR. HANNEY - Do you know how many swings per minute you can get out of a steam shovel?

to which was sent by the same person.

This particular letter (copy) was dated in May 1917 and was

sent, as mentioned on the letter itself, to the person who was

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being at that time the name of the letter is mentioned as the person

and as mentioned I had a copy of the letter of November 20th, 1917.

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having not been in a very long time in the country and when

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1917 - The letter was dated in the month of May 1917.

1917 - The letter was dated in the month of May 1917.

1917 - I do not know.

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1917 - The letter was dated in the month of May 1917.

1917 - The letter was dated in the month of May 1917.

MR. FRASER - No, I carry it in yards per day rather than swings.

Mr. Fraser is right, but he should go one step further, and carry it in yards per month. The lusiest looking and fastest swinging shovel on the job may be dumping a half-filled dipper most of the time, while a comparatively sluggish looking shovel beside it may be lifting an extra half yard of material on the dipper teeth at every swing.

Under such circumstances, the only basis of comparison is the engineers' return at the end of the month. A fast swing has no significance whatever by itself.

PAGE 5327:

MR. HANEY - They might have taken practically the whole of the material to St. Davids, and that would be on a downgrade. The advantage of taking it to St. Davids was that it was downgrade, whereas the disposal area opposite mile post 2 was on a 1% upgrade. It was all on a temporary trestle.

A glance at E. chapter H, pages 53 and 54, is sufficient to demonstrate the error of the above statements, as related to the proposal to eliminate the Lundy's Lane disposal area, and dump all the excavated material at St. Davids. In the first place, this proposition would have involved a minimum extra haul of $5\frac{1}{2}$ miles for all material south of mile post 2. Also, in this $5\frac{1}{2}$ miles, there would have been 5,000 feet of .86% grade against loaded traffic on the main line, and 8,000 feet of 1% grade against loaded traffic on the St. Davids disposal spur. In other words, there is nearly $2\frac{1}{2}$ miles of grade approximating 1% against loaded traffic between mile post 2 and the St. Davids disposal. As against this, there is only 1,000 feet of grade approximating 1% against loaded

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10. There is a slight dip in the first 100 ft.

1944-1945

be changing a half-filled dipper most of the time, with

It is requested that you advise me if it may be fitting to have some half yard of material

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A copy of the report of the Committee on the Status of the American Indian is being distributed to the members of the House of Representatives.

and a number of other factors. The results of the study are presented in the following table.

schützt, ist die beherrschende Positionen wie die auch das „erste Dreyer II“ wird „offenbar“

14. *Journal of the American Medical Association*, 1934, 103, 1031-1032.

traffic between mile post 2 and the Lundy's lane disposal area, and the total length of haul from mile post 2 to the Lundy's lane disposal is only 2,500 feet, as against $5\frac{1}{2}$ miles to St. Davids.

The only trestle on the Lundy's lane disposal spur was a 30 foot crossing of the Welland Road.

If the 6500 second-foot scheme had been carried out without any enlargements and under 1917 conditions, the Lundy's lane disposal area would probably never have been developed.

PAGE 5329:

MR. HANEY - The question is, the method that you would adopt to take this excavation out in three years; that is, 9,000,000 yards of earth, overlying 4,000,000 yards of rock.

The possibility of taking out 9,000,000 yards of earth and 4,000,000 yards of rock in three years was never at any time considered as even a remote possibility. The three years mentioned by the Chief Engineer in his memorandum to the Commission under date of January 11th, 1917, was a preliminary estimate only, and not a worked out schedule similar to that included in my report of December 26th, 1917. This three year estimate furthermore, involved in all a total of 9,603,070 yards only, made up of 7,036,090 yards of earth and 2,576,980 yards of rock, or 26% less work than Mr. Fraser was given to understand that we intended to do in the three years' time. Furthermore, 1,125,000 yards of the above total of earth yardage was in the earth section of the canal at Montrose which, at the time of the Chief Engineer's memorandum to the Commission, was intended to be dredged, and not excavated in the dry, resulting in a yardage actually 36% less than Mr. Fraser understood was to be taken out in the dry.

First cut was made through and around old box 2 then the ground around

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AN ORDER OF THE COURT OF THE DISTRICT OF COLUMBIA, entered at Washington, D.C., on the 11th day of May, 1917, in Case No. 10,000, entitled *United States v. [Name]*, is hereby made a part of this record.

1994-1995 3000 000

1. 1950 - The total number of persons in the United States was 150,000,000. The number of persons in the United States in 1950 was 150,000,000.

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1. The first of these is the fact that the Commission has not yet received any information from the Government of the United Kingdom regarding the proposed amendments to the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) which were adopted by the General Assembly of the United Nations in December 1979.

14. The above information is true and correct to the best of my knowledge and belief.

the Commission's report of 1967, and a preliminary report of 1968.

14. Please do not include name or address of donor for Section 501(c)(3) office.

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The price is about \$70,000, it is no more - plus about \$100,000 to land

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(The above information was obtained from the records of the FBI)

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1. The first group of people who were arrested were the members of the "Red Army" who were active in the city of Moscow. They were arrested in the month of May, 1937.

The subject of the investigation was the use of the following materials:

1875

The above information is all obtainable from ER, chapter K, appendix 1-4, et seq.

PAGE 5328:

MR. HANEY - What would you do as a contractor on the question of the practicability of these large units? I do not think they are economical or practical.

MR. FRASER - Well, in the canal work the expense of climbing out of the canal is a very large one, and these machines, which would land the material away up on the bank, look very good to avoid these inclines for climbing out, if it is soft ground and slippery.

Mr. Fraser has fairly well summarized the whole situation in his reply to the above question, and a little elementary arithmetic is all that is necessary to prove Mr. Fraser's point for the large units, as against Mr. Haney's scheme for small railroad type shovels and long trains.

The total maximum lift of the 70 ton shovel is 17 feet, and the total maximum lift of the 225-B shovel is 80 feet. With ten small shovels working in series, the track system necessary to give adequate service to each shovel would obviously require frequent ramping out of the cut. Such being the case, the excavated material would have to be lifted out of the cut in the vicinity of the point from which it was excavated. The point at issue is, therefore, whether the material should be lifted the whole distance with the shovel, or whether it should be lifted 17 feet with the shovel, and the balance of 63 feet with trains.

For instance, from Station 205 to Station 235, and from Station 335 to Station 365, the overburden was of such a depth that the maximum lifting range

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FEDERAL BUREAU OF INVESTIGATION
WASHINGTON, D. C. 20535

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The total maximum lift of the 70 ton shovel is 17 feet, and the total

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U.S.A.

of the big shovels had to be utilized, so that in this section the whole of the 63 feet of excess lifting range of the big shovels over the small shovels was effective, as against the absorption of this extra lift by train service.

The absorption of this maximum extra lift of 63 feet by 25-car trains, and 30 yard cars, operating on $1/2\%$ grade, would necessitate a train haul of 2.4 miles per train over a complicated and unwieldy system of tail-track. In other words, every yard of material excavated by these shovels would have to spend anything up to one hour on bad track and soft ground before being lifted into the clear, and headed for the disposal area. The big shovels accomplished this same end in a few seconds and landed the material directly onto firm, ballasted, permanent track.

Some data bearing on the question as to whether or not these large shovels are "economic or practical" is obtainable from an intelligent perusal of Mr. Goodwin's report on excavation methods and equipment.

Apparently as long ago as 1916, these shovels were in effective use on construction work similar to that at Niagara, and everyone familiar with modern methods of handling this class of work knows that the use of these large shovels is becoming standard practice on stripping work, where faces ranging upwards from 30 ft. are involved.

The shops of the Bucyrus and Marion Companies are glutted with orders for these shovels, placed by iron, copper and coal mining companies all over North and South America. Large numbers of these shovels are, furthermore, electrically driven, although the Niagara work was possibly the pioneer enterprise in this connection.

PAGE 5329: 6 further but conditions.

MR. HANNEY - You have practically 9 miles where you do not have to climb out, and with a very large percentage of the rock there is no climb at all.

MR. FRANK - Don't you have some climb?

This statement is hard to understand. Possibly the idea in this connection would be to start at the Lundy's Lane summit, and work both ways from the summit, taking out parallel cuts on a self-draining grade. This procedure would unavoidably involve an immense amount of moving back, and a wilderness of loading and disposal tracks which would have to follow the shovels down to within 10 ft. of the rock surface ~~wherever it might occur~~.

If there were no "climbing out" the disposal tracks would have to parallel the loading tracks in the bottom of the cut as it went down, and would involve the continuous shifting of a continuously and enormously increasing mileage of track, the gradient of which on the last bench would be governed, not by the grade of the shovel, but by the natural gradient of the rock.

The one all-sufficient reason why such a scheme would be absolutely impossible is because of the often-repeated statement that the bottom would hold neither the small shovels nor their service track, a fact which was apparent when the original borings were made, and which was one of the controlling factors involved in the decision to use the large shovels. Among other reasons why this scheme would be impossible, the following may be mentioned offhand:

(a) - With all the shovel capacity concentrated on stripping operations, it would have been impossible to provide ballast for track systems and roads.

(b) - It would have been impossible to put in temporary trestle diversions on the railroads and main highways, because each succeeding series of shovel

Mr. Hoover - Don't you have some ideas?

COPY

cuts would destroy the foundations.

(c) - It would have been impossible to build the permanent railroad or highway bridges until the earth and rock work in the canal was finished, because there would not have been room beneath them for the track systems which would have been necessary for handling the excavated material without "climbing out".

(d) - It would have been impossible to build the big rock fill at Bowman's Gully in time to allow a sufficient period for settlement, before placing the concrete lining and filling with water.

(e) - The unrestricted free drainage north and south from Lundy's Lane would have gorged such natural waterways as DeWitt's Creek, Galley's Creek, and Muddy Run with silt, and in the latter instance would have damaged the sewage system of Niagara Falls.

As to the statement that "a very large percentage of the rock there is no climb at all" a glance at the profile in FR, chapter II, page 31, shows that the rock section of the canal is essentially a hole, 8 miles long, 50 ft. deep at the forebay, 85 ft. deep in the middle, and 60 ft. deep at the Montrose end. It is difficult to imagine how "a very large percentage" of this rock could be removed with small shovels without "climbing out". As a matter of fact, it is only necessary to look at the cross section of the rock cut, and some of the pictures of the completed excavation, to realize how utterly impossible it would be to take out this rock at all with a 70 ton shovel, owing to the absolute lack of sufficient working room for the proper co-relation of shovel, train service, blasting, and drilling operations. Furthermore,

— 1997 —

— Further testimony of this kind is abundant in the case of (a)

Although the work on the earth and work in the canal was finished.

INTERNAL SECURITY - R

which would have been necessary for handling the material collected at Kilauea

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64. 1971-1972 year class still present at Silver Lake, June 1980. (A)

country's ability to draw a sufficient portion of its national income

limited the company's ability to raise capital.

(g) = The investigation from January 1997 and March 1998.

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on which we will be able to see the results of the work of the

There is no mention of the name in any of the other documents.

There is no doubt that the above is the correct way to do it.

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draglines would have been useless on this work, and the only other possible method of moving this rock, below the first 10 ft. bench, would have been by means of derricks and skips.

PAGE 5329:

MR. FRASER - What output did the shovels actually get per month?

MR. HANEY - I think with these big shovels they got as high as 70,000 yards per month on a 10 hour shift.

MR. FRASER - That is a small output for that class of shovel. We have under similar conditions taken out 45,000 yards of clay in a 10 hour shift with a 70 ton Bucyrus shovel.

Apparently, the only place where "similar conditions" would apply is in the case of No. 11 shovel in the heavy clay in the vicinity of the Convent Road. No. 11 shovel worked for five consecutive months in this material before going into rock in July of 1921. The average for the five months was 76,700 yards per month, and the maximum month's work was 94,500 yards on a 10 hour day shift basis, with a 30 ft. lift. In August 1919, No. 8 shovel, working in quicksand near Victoria Street, took out 90,500 yards on the 10 hour day shift, with a 70 ft. lift. The railroad type electric shovels on the Niagara work got "as high as" 66,500 yards in one month of 10 hour day shift, with a 10 ft. lift. In passing, the above figures may be instanced as another proof of the production superiority of electric shovels over steam.

PAGE 5330:

MR. FRASER - I would not estimate the shovels in earth at more than 40,000 yards per month - that is, assuming that you have a dry bottom and good train service, and nothing that requires blasting or shaking up in any way.

Examination of the above mentioned and other papers, and the same were found to be

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Mentioning dry bottom, Mr. Fraser has prescribed a condition which did not exist at Niagara. This fact has been repeatedly mentioned heretofore, and is not susceptible of contradiction in the slightest degree, and definitely decides the merit of any scheme involving the removal of any such average as 40,000 yards per month with railroad type shovels.

PAGE 5330:

MR. HANEY - They found at the surface of the rock some quicksand.

I happened to be there and saw the operation at the point where they had some trouble in that way. They had to work their shovels on pontoons. By taking off this earth first they would have had drainage.

MR. FRASER - Some soils will not drain sufficiently so that you will have a good bottom that you can work with a steam shovel on it.

Quicksand was not found at the surface of the rock. Most of the borings showed a thin layer of fine gravel at the surface of the rock with the saturated sands above. It was the existence of this thin gravel seam on the surface of the rock which led us to expect that the ground water would drain out through it when the cut was opened up, and thus provide reasonably dry digging. The ground water did actually behave more or less as anticipated, but throughout the whole distance between the Grand Trunk bridge and Landy's Lane, the lower stratum of earth was kept continuously saturated by heavy springs which discharged upwards through fissures in the solid rock. The existence of these springs had more to do with the failure of the shovels to realize their anticipated production than any other single factor.

The inference from Mr. Haney's above statement is that the shovels were working on pontoons on account of the quicksand. The quicksand had nothing to do with the use of the pontoons, as the shovels were working from the rock.

The pontoons were simply a convenient method of lining up the bridge rail for moving the shovel ahead, and they were used for no other purpose.

PAGE 5330:

MR. FRASER - Can you give the output for a year of one of the big shovels?

MR. FRANCIS - Shovel No. 1 in 1918 did half a million yards.

No. 1 shovel did not get to work until April of 1918, and lost nearly two subsequent months of that year, in the best working season, with mechanical and electrical trouble for which the manufacturers were responsible and made good. No. 1 shovel was the first large shovel placed in service, and these difficulties were remedied before the other shovels of the same type were placed in service. The record mentioned by Mr. Francis would, therefore, only apply to about six months of normally continuous operation.

As a matter of fact, the original working schedule was so disrupted by the scarcity of labor, labor troubles, and other unavoidable and unforeseen conditions arising out of the war, that not one of the large shovels had a normally continuous year's work in earth. No. 8 had the nearest approximation to a year's normal work in 1920, in which year she removed 1,002,738 yards, but this figure is far from being a fair measure of the capacity of the shovel, owing to the fact that the strike occurred in this year, and for the bulk of the time she was working in quicksand and baling out nothing but liquid mud for months at a time.

The nearest approach to a normal production record for one of these big shovels was that of No. 11 previously mentioned, for the months February to June,

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Shovel No. 1 in 1916 dug out a million yards.

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BUREAU OF LAND MANAGEMENT
WASHINGTON, D. C. 20246

inclusive. The maximum month's output for this shovel during the above period was 186,310 yards, and the average output for the five months was 151,463 yards. On the basis of this average output, the year's production would have been 1,817,556 yards. The material in this case was the heaviest kind of clay on a face averaging 26 feet in height, loading tracks about 30 feet above shovel grade, and the cut bottoming about 103 feet in width. The face was also fairly dry, but even here the material was so unstable that the loading tracks had to be carried on trestle, and shovel operations had to be interrupted so as to allow rip-rap to be dumped on the slopes on a line with the front trucks of the shovel, in order to hold the material in place.

Some further discussion as to conditions affecting the shovel schedule and the shovel production will be found in Appendix 11 attached.

PAGE 4331:

MR. FRASER - What was the width of the cut?

MR. FRANCIS - It would probably be 70 ft. at the tow of the cut.

The theoretical width of the bottom of the earth cut was 70 ft., but owing to the ultimately ascertained necessity of providing a heavy rip-rap fill throughout practically the whole length of the canal, to hold the unstable material in the slopes, the bottom width of the earth cut was taken out to the varying widths necessary for such base thickness of rip-rap filling as was considered necessary to hold the slope. For this reason the bottom width of the cut was sometimes as much as 110 feet, and averaged nearly 90 feet.

PAGE 5331:

MR. FRASER - I have no figure in my mind as to what proportion of the 9,000,000 yards would be in 30 ft. cuts; would there be 25% of it?

MR. HANEY - I do not think so.

Mr. Fraser, in asking this question, mentions a depth of cut which he

presumably considers is the maximum depth at which a 70 ton shovel can operate safely and efficiently. He also apparently has in mind the idea that the large shovels would not be necessary if less than 25% of the 9,000,000 yards was in cuts of 30 ft. depth or more. Mr. Haney's assurance that there was not 25% of the total yardage in 30 ft. cuts would be the controlling factor in his reasoning under this head. As a matter of fact, a glance at the profiles, FR, chapter N, page 131, is sufficient to indicate that south of station 368, the total yardage of overburden is in 30 ft. cuts or more.

South of Station 368 the average depth of cut is 47 feet, and the maximum 74 feet. From Station 120 to 280, a distance of 3 miles, the average depth of cut is 49 feet, and the maximum 65 feet.

South of Station 368, the yardage of overburden removed was 9,580,000 yards and north of Station 368, where the cut was 30 ft. or less, the yardage removed was only 217,000 yards.

In other words, there was 98 1/2% of the total earth yardage in cuts averaging 47 ft. in depth, and only 1 1/2% of the overburden was in cuts up to a maximum depth of 30 ft.

This one misconception alone is sufficient to destroy the significance of Mr. Fraser's whole argument for the small shovels.

Page 2

of the 9,000,000 votes would be in 35 to 40 percent of the total.

Mr. Hoover - I am not sure.

Mr. Hoover, in making this question, I think it is necessary to consider the maximum depth at which a 70 ton shovel can operate safely and effectively. In this connection, the fact that the shovel would not be necessary if the shovel was not used in the case of the 70 ton shovel is not a factor in the question. The fact that the shovel is not necessary under this head, in a matter of fact, a shovel at the position, Mr. Hoover, is not a factor in the question. The fact that the shovel is not necessary in the question is not a factor in the question.

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PAGE 5332:

MR. HANEY - Do you consider that Lundy's Lane would be the point where this work should be forced, and attack that point as quickly as possible?

MR. FRASER - With ordinary shovels, yes; but when you are planning to buy shovels to take that out in one cut might be different. Your big shovel had to have two lifts there for a distance of two miles. I think I might have started an independent operation there. Did they do that?

MR. HANEY - No, they did not reach that until March, 1921.

Mr. Haney's statement is not correct. An "independent operation" was started at Lundy's Lane with "ordinary shovels", precisely as Mr. Fraser prescribes, in September of 1919.

Mr. Fraser is quite right in stating that this summit cut could not have been taken out in one lift with the big shovels, and it was never the intention to do so. The main objective of the construction railway southward was to connect the summit with the disposal area at the earliest possible date, so as to start this "independent operation" with small shovels, and "force" the work at this point.

The attached blueprint, Appendix 12, shows that the construction railway reached Lundy's Lane in September of 1919, and the shovel records show that excavation started on the summit immediately, after the completion of single track construction to this point.

Mr. Haney tells Mr. Fraser that we did not start "an independent operation" at this point, and did not reach that point until March of 1921. As a matter of fact, by March, 1921, a total of 2,600,000 yards of material had been taken off the summit in the two mile stretch mentioned by Mr. Fraser.

PAGE 5332: - It involves the expenditure of a single dollar, as a business man's

MR. GREGORY - They planned to do the work within three years.

The work described to and discussed with Mr. Fraser was never at any time planned to be completed within three years.

PAGE 5333: - To serve a canal which would be built in the same manner, would it take any more time?

MR. GREGORY - They set out to build this canal at the same size it was built.

MR. FRANCIS - In the second plan they largely increased the size of the canal.

MR. GREGORY - They reported to the Government that they would be able to do it in three years, and they planned accordingly, and it was a canal of the same size.

Mr. Gregory's statements are in error. The canal which it was estimated would take a proximately three years to build was never built. Further down on this same page Mr. Fraser attempts to outline his method of procedure on the basis of this supposed three year schedule. What he says is meaningless, because the data given him as a basis for his reasoning was wrong.

PAGE 5333:

MR. FRASER - It is unusual, it is away beyond anything else that has been done, to do 13 miles of canal in three years.

13 miles of canal was never a factor, either in the three year estimate, or even in the actual schedule outlined in my report of December 26th, 1917, simply by reason of the fact that the placing in operation of the first two

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units did not involve the expenditure of a single dollar, or a single hand's turn of work, beyond the junction of the Welland River and the earth section of the canal at Montrose, or only about $8\frac{1}{2}$ miles in all.

PAGE 5334:

MR. HANEY - To serve a steam shovel, drill or hoist irrespective of efficiency, would it take any more men?

MR. FRASER - The same number of men will serve a steam shovel as formerly, but it takes many more on the dump.

Mr. Fraser's statement may be true at the present time as regards steam shovel operation, but on the Niagara work, from the spring of 1919 on, it usually took twice the normal number of pitmen to serve a shovel. On the Calumet Sag work a Model 300 Marion only used 2 pitmen. On the Niagara work and workability. North of Toronto's Billy it was of even texture and quality we were forced, by labor conditions, to use 8.

It was harder to handle than granite, owing to its irregularity and the way it
PAGE 5338:

MR. BOWER - They used half a million barrels of cement on the job in four years.

MR. FRASER - In that case they were not using cement any faster than we were.

Mr. Bower's statement was made in ignorance, and gave Mr. Fraser a wrong impression as to the rate at which cement was used, and had to be used, on the Niagara work.

Up to September, 1920, only 38,700 barrels of cement had been delivered and used, as the only concrete work which was done, or could be done, up to that time, was on the bridges and in the foundations of temporary buildings.

Between September 1920 and the end of November 1921, a period of 13 months, 444,242 barrels of cement were delivered and used, the average rate of use being over 34,000 barrels per month, or at the rate of 410,000 barrels per year.

PAGE 5340:

MR. RANNEY - What would the cost of taking out granite be as compared with taking out the rock at Chippawa?

MR. FRASER - The Chippawa rock would be much cheaper, it is limestone and some shale. We worked in shale at one time and we did not have to sharpen our tools at all.

Of the total yardage of rock taken out at Niagara, only 226,000 yards, or 5.2%, was shale. The balance was limestone of varying degrees of hardness and workability. North of Bowman's Gully it was of even texture and easily worked, but south of Bowman's Gully it was very hard to handle, and some of it was harder to handle than granite, owing to its toughness and the way in which it broke with shooting.

PAGE 5348:

MR. GREGORY - If the Hydro Commission had called you in before they began their construction work and told you the time in which they wished to do it, could you have given them a working plan by which they could have finished it in time?

MR. FRASER - Oh, yes. We have not failed in any power jobs, and they are quite comparable. We had 8 shovels working at one time in Cedars and I think 10 ordinary shovels would have done the earth work at Chippawa. It would require another batch of shovels to do the rock, or the earth shovels might have been used for the rock work later.

between September 1930 and the end of November 1931, according to the
investigation, the Bureau of Investigation and the Bureau of the
at the time they were being carried out, by the date of the
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at the time in the year of the year 1930 and 1931
been used for the work later.

In considering this reply of Mr. Fraser's it must be borne in mind that by his own admission, he has never at any time been nearer to the Niagara work than Toronto, and also that he is basing the above opinions upon the erroneous data which was given to him.

The practicability of using railroad type shovels for the rock work has been referred to previously.

From the above statement, Mr. Fraser apparently bases his ability to do the Niagara work with 10 ordinary shovels on the fact that he had 8 shovels working at one time on the Cedars job. It would be interesting to compare the monthly output of Mr. Fraser's 8 shovels at Cedars with the monthly output of the 9 regular shovels working at Niagara in the fall and spring of 1921. For instance, in March of 1921, these 9 shovels took out 350,283 yards of earth and 231,016 yards of rock, or a grand total of 581,299 yards for the month. Even previous to the spring of 1920, through the worst period of labor trouble, inefficiency, and other war conditions, the 7 regular excavating units then in commission averaged 343,000 yards of earth and rock per month. Mr. Fraser should be given these figures to think over before he schedules his "10 ordinary shovels" to take out the earth and rock at Niagara.

PAGE 5346:

MR. HARRIS - If you had an estimate in 1917 on a job, and if you knew the conditions that existed, and if you had estimated in the beginning of the year that job would cost \$13,000,000, and at the end of the year you revised the estimate and made it practically double that, and if you then said - "this takes in everything and is absolutely safe", and then when you completed you found you were 200% above that figure, what would you think of yourself as an engineer?

MR. FRASER - I do not know. We did not do this job and jobs are all different. Generalities are one thing and what another fellow should have done is not fair to ask of us.

The question asked was entirely misleading. Never having seen the work and knowing nothing of its history, Mr. Fraser's answer was obviously the only one he could have made.

ANSWER, estimated to cost \$75 per yard.

PAGE 5346: The estimate for the cost of work on the Welland Canal was estimated at \$75

MR. FRASER - I would suggest that the preliminary estimates must have been too low, the increase in cost of doing the work did not account for all that difference. The prices for the Welland Canal work were too low. I made an estimate on the work, and I consider that the prices at which the work was let were too low.

As Mr. Harris put his original question, the only inference Mr. Fraser could possibly make was that the preliminary estimates were too low, simply because Mr. Harris gave him to understand that the work as it now stands, cost four times what it was originally estimated to cost. The increase in the cost of work certainly did not account for all that difference.

It seems hardly necessary to pursue this argument further.

As to the prices for work on the Welland Canal, it may be worth while to mention that they were high enough to allow most of the sub-contractors to make money. This statement is not based on rumor, but on fact.

PAGE 5347: The estimate for the cost of work on the Welland Canal was estimated at \$75

MR. HANBY - They estimated that the rock cutting would cost 85¢ per yard in 1917.

MR. FRASER - That was too low.

MR. HANEY - And that the earth excavation would cost 26¢. But for prices

MR. FRASER - That was too low. I would say from my experience that it would be quite impossible to do either of these things at that date.

The attached curve, Appendix 12, shows the contract prices for earth and

The cost of rock at Niagara was never at any time, or under any circumstances, estimated to cost 85¢ per yard.

These curves being derived from figures similar to those for 1917

In 1917 the minimum net cost of earth and rock was estimated at 26¢

Mr. Hane's report on construction methods on and 97¢ respectively, and it is only fair to observe further that in my

Appendix is presented are tabulated actual unit costs for earth on

report of December 26th, 1917, Appendix 7, the possible maximum cost of earth

and rock was estimated to be 33¢ per yard and \$1.21½ per yard respectively.

These costs were on the basis of electric operation and, of course, would not

come within Mr. Fraser's "experience". The price coming within Mr. Fraser's

experience was the estimated cost of earth with steam operated equipment, as

set forth in Appendix 8 of my report above mentioned; namely \$3.6¢ per yard,

or 61% higher than the estimated cost with electric operated plant. Applying

this same percentage of increase to the estimated rock cost of \$1.21 per yard,

we get \$1.95 per yard for rock with steam operated equipment, which figure

agrees reasonably well with Mr. Fraser's estimated cost of \$2.00 per yard.

PAGE 5347:

MR. HANEY - What would you have said for the earth?

MR. FRASER - A huge quantity like this, in 1917, taking chances

of running over three years, I am not sure how high my

ideas had gone in 1917. I know that in 1919 I would have

said \$1.00.

There, I think, is the answer.

200

... and that the earth excavation would cost \$24.

It would be like tomorrow in the future of the world.
that date.

1943

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There is some variation in the size of the different groups of the same species, but the general trend is that the larger the group, the more variation there is in the size of the individuals.

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6.2. Normalized reference units. The above 14 item categories are now summarized

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Q. HARRY - What would you have said for the benefit?

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of running over three years. I am not sure how high my
 1914-1915 was in 1915. I was not in 1915. I was not in 1915.

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In the fall of 1917 experienced contractors like A. C. Douglass, Hugh L. Cooper and Company, etc., told us that the earth could be taken out for prices ranging from 35¢ to 38¢ with steam operated equipment, and that rock could be taken out for prices ranging from \$1.56 to \$1.75 with steam operated equipment.

The attached curve, Appendix 13, shows the contract prices for earth and rock on the Calumet-Sag section of the Chicago Drainage Canal in the fall of 1916, these curves being compiled from figures similar to those set forth in Mr. Goodwin's report on excavation methods and equipment.

In Appendix 14 attached are tabulated actual unit costs for earth and rock which obtained on the Niagara work during 1917, 1918 and 1919. It would appear from these figures that Mr. Fraser would have made quite a lot of money if he had had the contract at \$2.00 for rock and \$1.00 for earth. Conversely, it would appear to show that we exercised good judgment in deciding to do the work ourselves.

PAGE 5348:

MR. HANEY - Up to the time of the strike they evidently must have worked with a force of approximately 2,000 men. Then they had a strike and they put on a night force and they increased their working force to 8,000 men and I presume they increased their plant. Then they dropped the night force and dropped back to 3,000 men. I cannot understand what they did with these 5,000 men, assuming they did work a night gang.

MR. FRASER - They were running night shifts on the shovels.

Night shifts were being worked on the shovels for some time before the strike of 1920, and this fact had nothing to do with the increase in the working force, except insofar as it was necessary to add the working force required to

operate the two new shovels and auxiliary equipment purchased in the fall of 1920. This, of course, accounted for a considerable number of extra men.

Without attempting to discuss the accuracy of the figures quoted in Mr. Haney's above statement, it may be stated that the main cause for the increase in the number of men was that up to the fall of 1920 no concrete work had been undertaken, and the construction of the power house had not been started. The construction work on the power house started in November of 1920 and the concrete work in the canal started in the early part of the year 1921. Also, the construction work on the gate-house started in the spring of 1921. These three new operations reached the peak of their activity about June of 1921, and then tapered off gradually until in July form construction and similar classes of work began to wind up, and a considerable number of carpenters and other classes of labor were laid off. Furthermore, in July of 1921, when arrangements were made with the Niagara Falls Power Company to carry the fall peak on the Niagara System until the end of the current year, the construction schedule was extended from September 1st to January 1st, thus enabling a considerable portion of the night shift work to be discontinued, and allowing a further considerable reduction in the working force.

The abolition of the night shift, and the redistribution and culling out of the working force thereby made possible, had an immediate and marked effect on operating efficiency, as indicated by the discussion in Appendix 15 attached.

PAGE 5348:

MR. HANEY - In order to do \$30,000,000 worth of work they spent \$17,000,000 on plant. What do you think of that?

MR. FRASER - That is a much larger amount than we ever spent; a much larger proportion.

This statement means nothing to Mr. Fraser, as the figures quoted are neither correct nor in accord with Mr. Fraser's understanding of the situation from a contractor's standpoint. This particular phase of the argument is covered by Appendix 8 previously referred to.

PAGE 5349:

MR. GREGORY - What have you to say about working at the peak first?

MR. FRASER - Looking at the diagram showing the percentage of earth and rock excavated each month throughout the progress of the work, I would say that the output in the early months was too small, considering the total work to be done in the time.

MR. GREGORY - How would you have proceeded about it?

MR. FRASER - We would have had to have much better progress the first year. Their first year of earth excavation was away short and the rock excavation started too late.

As previously stated, these opinions of Mr. Fraser as to the working schedule are worthless by reason of the wrong premises given him upon which to base his judgment, as it was never contemplated that the work described to Mr. Fraser would be completed in three years. The explanation of the apparent lack of progress in 1917 is fully covered in Appendices 5 and 6 of my report of December 26th, 1917, and if this program had been shown to Mr. Fraser he would not have expressed the opinions above quoted.

PAGE 5349:

MR. GREGORY - Do you mean the rock excavation started too late in order to do the work most economically?

MR. FRASER - Yes, from my very brief examination of the profiles, it looks as if an independent start could have been made on both sides of the high cut at about mileage 3.

This statement does not seem to agree with the opinion expressed by Mr. Fraser on pages 5329, and 5330 of the evidence, where he states that the proper procedure would be to remove the earth overburden first, and then attack the rock "from every point that you can get in".

PAGE 5349:

MR. HANEY - If they had adopted another progress program they would have had a much larger percentage of the work done before the prices went up?

MR. FRASER - Yes, but that was something that would have been hard to foresee.

Mr. Haney could have framed this question more fairly as follows:-
"If the progress program set forth in the report of December 26th, 1917, had been followed, they would have had a much larger percentage of the work done before the prices went up". The answer to this question will be found in Appendix 16 attached, which indicates not only that the earth and rock work have been completed within the schedule time, without the extra plant purchased in 1920, but also that it would have been completed for a figure corresponding very closely to the 1917 estimate. It can only be repeated once more that the only progress program followed during the period between the spring of 1918 and the early fall of 1920 was the program forced upon us by the war, and the undreamed-of conditions, arising out of the war, subsequent to the armistice.

PAGE 5350:

MR. H. A. ROSE - What is your idea about costs after the war? We were looking forward when the war was over that prices would go down. Would you not expect them to come down quickly after the war?

7-12-1944. The above mentioned ship was seen in the vicinity of the coast of the United States on the 12th of July, 1944. The ship was seen by the crew of the U.S.S. "Albatross" (AG-42) while on a patrol mission in the Gulf of Mexico. The ship was seen to be a large, dark-hulled vessel with a white superstructure. The ship was seen to be moving in a southerly direction. The ship was seen to be a large, dark-hulled vessel with a white superstructure. The ship was seen to be moving in a southerly direction.

REMARKS - It was noted that the weather was very warm and
that a small amount of rain fell at the end of the day.

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[illegible]

MR. FRASER - Yes.

MR. HANBY - And yet the peak did not occur until 1920 - two years after?

MR. FRASER - We anticipated a drop when the war ended.

The above statements are fully in accord with my evidence given before Mr. Howell, pages 4145 to 4149, and 4181 to 4182, inclusive. As then stated, in connection with the status of the original estimates in January, 1919, it was thought that conditions as then existing, a year after the war, could not possibly become worse, and the break, which would mark a rapid return to conditions approximating those which existed before the war, was expected daily.

At this time not a yard of concrete had been placed, only 11.7% of the earth, and 3.6% of the rock had been removed, and the overrun on rock and earth costs was of such a trifling nature, when considered in relation to the amount of work still to be done, that no anxiety was felt as to making this overrun good when the expected break in industrial conditions materialized.

PAGE 5352:

MR. HANBY - The cost of unwatering that plant was put in at \$1,800,000?

MR. FRASER - I have no idea what they did.

MR. HANBY - You would not have any idea as to what was necessary?

MR. FRASER - Not without making a study of the plant. I have never heard what unwatering they had to do. It is a most difficult item to figure.

The amount of this item is far beyond anything that was anticipated when the work was undertaken and must, of course, take its share of the burden

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101-100, 27. In all but one case, the *polymorphus* was not found.

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1. The first part of the report is a general statement of the purpose of the study and the objectives of the research. It also includes a brief review of the literature on the subject.

The amount of this type of behaviour reported was

...and the ... of the ...

imposed by the unforeseen working conditions which existed up to the fall of 1920. This general condition resulted in a disruption of the pre-arranged working program which made it impossible to obtain the gravity drainage into Bowman's Gully which was originally contemplated, and which has been previously referred to in this memorandum. See also Appendix 11.

Apart altogether, however, from the general condition above mentioned, one specific factor having an immediate bearing on unwatering cost was the existence of innumerable living springs discharging into the cut through vertical fissures in the solid rock. As previously stated, a number of these big springs were actually uncovered by the excavation, and others undoubtedly existed elsewhere under the overburden, on both sides of the canal. Therefore, instead of having to dispose temporarily of ground water seepage, it was necessary to handle a large continuous inflow from these springs. This inflow, furthermore, had to be disposed of almost wholly by local pumping on account of being unable to obtain the anticipated free drainage into Bowman's Gully. During the period between the spring of 1920 and the fall of 1921, it was necessary to handle as much as 20,000,000 gallons per day by local pumping, with over 30,000,000 gallons of installed pump capacity. There is no rational means of determining by what amount the cost of unwatering would have been reduced if these big springs had not existed, as the total amount of water handled was a combination of spring inflow and ground water seepage, and it is impossible to estimate what proportion of the total inflow was respectively chargeable to these two sources of supply.

PAGE 5353:

MR. ROSS - Material costs were at their peak in May, 1920, and I

fancy labor cost would be a month or two later.

MR. FRASER - Some big jobs were discontinued in September. We had a big job cancelled in September, 1920, and costs were just tumbling from that time, and anybody making an estimate on the 1920 costs in 1920 would be sure to over-estimate.

Practically all capital obligations on the Niagara work were incurred previous to 1920, and the benefit of the reduced labor costs did not obtain on this work until August, 1921.

PAGE 5353:

MR. GREGORY - Now would these prices Mr. Francis has given you compare with estimates for similar work you were making at the time, at the end of 1917?

MR. FRASER - They are lower than ours.

The above statements apply to concrete prices quoted by Mr. Francis and applicable to the work as estimated in 1917. In this connection, please note Appendix 12 of my report of December 26th, 1917, in which the price of concrete is estimated in the fall of 1917 by some fairly prominent engineers and contractors. For instance, one contractor, P. McGovern & Company, estimates \$6.50 per yard as a tender price, which would, of course, include an estimated profit. This price should therefore be compared with the average estimated price for canal concrete in the estimate of December 26th, 1917, which was \$8.80, plus 25%, or \$11.00 per yard. It may be well to note also that the \$10.00 and \$12.00 prices quoted by Mr. Francis for reinforced concrete are really mass concrete prices, as the steel was in all cases estimated separately, and applied to temperature bars exclusively. The \$6.50 price applied wholly to bottom concrete placed without any form construction whatever.

PAGE 5354:

MR. GREGORY - As a matter of fact, the actual cost (of concrete) ran up to \$21.00 and \$30.00. How do you account for a simple block of ordinary concrete costing \$24.00?

MR. FRASER - I could not say.

Obviously, Mr. Fraser could not make any other answer, as he had never seen the work, and therefore could not know just what Mr. Gregory meant by "a simple block of ordinary concrete". As a matter of fact, not a yard of this concrete was placed in the power-house substructure, the gatehouse substructure, or in the canal lining walls until the fall of 1920, and after the work had been checked up and re-estimated by independent engineers in the light of known conditions obtaining since 1917. The average price of \$24.00 mentioned by Mr. Gregory has, therefore, no direct connection with the prices in the 1917 estimate, but is comparable on the other hand, with the prices estimated by Stuart and Kerbaugh and H. L. Cooper and Company in 1920. The average price of concrete as estimated by Stuart and Kerbaugh was \$16.80 per yard, and the average price of concrete as estimated by H. L. Cooper and Company was \$18.48 per yard.

PAGE 5368:

MR. HANBY - Do you think they had sufficient knowledge of the character of the work to realize that?

MR. CHADWICK - Oh, they should know that a contractor could not prepare an intelligent bid for work of that magnitude in that time.

We also knew that no contractor would do so. This opinion is confirmed by Mr. Chadwick's answer to the next question as put to him by Mr. E. A. Ross.

PAGE 5371:

MR. HANEY - Would you use such a type of shovel as was used there?

MR. CHADWICK - I could not say as to that because I never went into it far enough to find out what our plant would be, but I think we would use the standard shovel. I do not think a contractor would, or could, load up with that kind of equipment.

We knew this at the time the decision was made to do the work on force account, and we also knew that the work could not be done with standard shovels.

PAGE 5374:

MR. GREGORY - We have **COPY** no record of any contractor who ever considered giving a lump sum contract. I was asking you about terms upon which you would be prepared to take it.

MR. CHADWICK - I do not think any contractor could possibly have taken that on a lump sum contract.

We were fully aware of this attitude on the part of contractors at the time the decision was made to do the work on force account.

PAGES 5374 and 5375:

In these two pages of the evidence Mr. Chadwick expatiates on the advantages of a coherent and expert working organization. As previously set forth in connection with Mr. Larkin's evidence, a precisely similar organization handled the Niagara work. This work was in charge of two of the best construction men in America, and the important positions in the organization were filled by men who had worked with them, and with each other.

100-10000

THE SECRET - This was the first time of showing as was used there?

THE SECRET - I would not say it is a very good thing, but I think we would use the standard model. I do not think a contractor would, or could, load up with that kind of equipment.

We know this at the time the decision was made to do the work on time

because, and we also know that the work would not be done with

results.

100-10000

THE SECRET - I do not know how much equipment would be used, but I think it is a very good thing. I was talking to the contractor who was to do the work, and he said that he would be pleased to take it.

THE SECRET - I do not know how much equipment would be used, but I think it is a very good thing. I was talking to the contractor who was to do the work, and he said that he would be pleased to take it.

It was very good to see the results of the work on time

the time the decision was made to do the work on time

100-10000

In these two pages of the report of the Commission on the Organization of the Executive Branch, it is pointed out that the work on time was very good. It was very good to see the results of the work on time. It was very good to see the results of the work on time. It was very good to see the results of the work on time.

It was very good to see the results of the work on time

It was very good to see the results of the work on time

for years.

Mr. Chadwick's statement that a considerable number of his foremen were employed on this work is evidence of the fact that the Foundation Company does just as any other construction organization would do; namely, when a new piece of work is undertaken, they go into the market for their foremen and hire them for that particular job. If the Foundation Company had been given the Niagara work on a cost-plus basis, they would have had to go into the market for 90% of their supervisory force, and if they had any other work in progress, at the time of getting the Niagara work, what they would have done would have been to assign one or two men only to this work from their permanent organization, and a supervisory force would have been organized on an entirely new basis from that point down. They would, of course, endeavor to re-employ as many of their old men as possible, but as previously stated, this is precisely what was done under the conditions which actually obtained.

PAGE 5380:

MR. GREGORY - Was there any comprehensive plan of the whole work submitted to you?

MR. CHADWICK - No.

There was no such plan in existence at that time. This phase of the situation is fully covered in FR, Chapter G, pages 3, 15, 31, 32, 33 and 34.

PAGE 5384:

MR. GREGORY - What would you say to the qualification of this man Salter as a purchasing agent? Would he be fully qualified to do the purchasing for construction work?

[illegible]

MR. CHADWICK - I would probably say no, that he would be very well qualified as a purchasing agent for the Hydro-Electric Power Commission but not as a purchasing agent for a construction contract.

Superintendent's opinion as to the proper location of power house, and

- Mr. Chadwick is correct, and the purchases referred to were not made by

Mr. Salter. The Chief Engineer was the authorized person. The purchasing agent

was not authorized to make purchases for the construction department. The purchasing agent

PAGE 5385:

MR. HANNEY - We are dealing with contractors' requirements for construction purposes, which is very different from the regular purchases of an organization.

MR. CHADWICK - Yes, he has got to know the stuff he is buying. As a rule in our organization, the same man that purchases material for the work does not purchase plant. The General Superintendent himself purchases the plant.

The procedure on the Niagara work was precisely similar to that outlined above by Mr. Chadwick. Materials, such as cement, rail, ties, poles, copper wire, etc., were purchased through Mr. Salter's department. Plant, such as drills, shovels, compressors, conveyors, rock crushers, locomotives, etc. were purchased through the Plant Engineer on the work, who was under the immediate jurisdiction of the General Superintendent. In this latter case the function of the Purchasing Department was limited to the official confirmation of the order, and the issue of the necessary formal documents.

Furthermore, the purchasing agent was not authorized to make purchases for the

PAGE 5386:

MR. J. A. ROSS - Acres would make up his mind that he wanted a certain class of equipment to carry out a certain program, and then he would turn that over with full specifications to the Purchasing Agent and say - "Here, get this for me".

Mr. Allen - I would like to say that I am not a member of the
Board of Directors but as a purchasing agent for a com-
pany I am interested in the same.

Mr. Allen is correct, and the purchase of the same is

Mr. Allen.

Mr. Allen.

Mr. Allen - I am interested in the same, and I am not a member of the
Board of Directors, which is very different from the regular
purchase of the same.

Mr. Allen - I am not a member of the Board of Directors, and I am not
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interested in the same. The same is the same. The same is the same.

Mr. Allen - I am not a member of the Board of Directors, and I am not
interested in the same. The same is the same. The same is the same.

Mr. Allen.

Mr. Allen - I am not a member of the Board of Directors, and I am not
interested in the same. The same is the same. The same is the same.

He did more than that. He issued the specifications, where such were necessary or possible, received the quotations or tenders, got the General Superintendent's opinion as to the proper quotation or tender to accept, and finally closed the deal, subject only to the final authorization of the Commission and the Chief Engineer for the expenditure. The completed negotiation was then turned over to the Purchasing Department for the routine procedure. This routine procedure involved no delay or misunderstanding whatever, as all essential negotiations with the vender had previously been completed.

PAGE 5389:

MR. HARRIS - They had a great chance in the early part of 1919 to make their purchases and secure everything they required, because for six months everything was in a very uncertain condition. If they had come into the market then they could have made better contracts.

MR. CHADWICK - Yes, if they could have foreseen. We can look back and say Yes, but at the time we might not have foreseen what was to occur.

From the practical standpoint alone, the impracticability of Mr. Harris' idea is evident, because even if contracts for material and plant needed for future use could have been placed in the early part of 1919, the handling, storage, and carrying costs would have been such that no one would have considered any such method of procedure.

Furthermore, the condition was just as Mr. Chadwick mentions above. No buying was done at that time beyond current requirements because everybody was waiting for the big break which was expected to occur any day at that time. Also, as a matter of fact, Mr. Harris' statement is wrong in respect of the particular commodities which were needed on the Niagara work, as Appendix 17

as all essential communication with the vendor has previously been completed.

[illegible][illegible]

From the preceding statement it is evident that the investigation of the case is still in progress, and that the results of the investigation will be reported to the committee as soon as they are available.

[illegible]

attached hereto will indicate. The price curves on this sheet are authentic, and show no drop whatever in the early part of 1919. Mr. Harris' statement may have applied to the speculative commodities, such as sugar, wheat, cotton, etc., but it did not apply generally in connection with the plant and standard commodities used on engineering construction work.

PAGE 5390:

MR. HANEY - Comparing the railways with Hydro, would the railways be in a better position to do the work themselves than Hydro at the time this work was done?

MR. CHADWICK - I would say the railways would be in a little better position to do their own work.

COPY

If the railways had been up against the same proposition as the Hydro during the war, with regard to a large piece of work, they would not have done it at all, and certainly not in the public interest, or for the purpose of furnishing needed assistance to the allied armies. Leaving out conditions which obtained during the war, with regard to the absolute urgency of providing electric power for the manufacture of munitions and other war materials, the Hydro has never handled a large power development work in any other way than by schedule contract. This was the practice before the war, and it is the practice at the present time.

PAGE 5391:

MR. HANEY - Do you know what it is costing on an average to do that kind of work?

MR. CHADWICK - Oh, yes, it was costing us all kinds of prices for different classes of work. For instance, we were taking out earth at Fort Colborne during the war and we were hauling over a mile and making a fill with it for 26¢ per yard, as far as I can remember.

This statement does not square very well with Mr. Fraser's opinion that the cost of earth should have been \$1.00 per yard at Niagara in 1919, and furthermore demonstrates the utter absurdity of comparing the unit costs of earth and rock work on different jobs, without complete and authentic data as to the comparative local and general conditions. Neither Mr. Fraser nor Mr. Chadwick ever saw the Niagara work at any time.

PAGE 5392: - for material out of our "government" list.

MR. FRANCIS - The estimates were from \$6.50 to \$12.00 per yard.
\$6.50 was for plain concrete and \$12.00 for reinforced.

COPY
In this connection please note the discussion of Mr. Fraser's evidence under this head on pages 5353 and 5354.

As previously stated, in connection with Mr. Fraser's evidence on concrete cost, the \$12.00 price was really a mass concrete price, owing to the fact that the steel was simply temperature reinforcement, and was all figured separately. Reference to FR, chapter K, Appendix 6-I, will show that out of a total estimated quantity of 353,473 cubic yards of mass concrete, only 59,813 yards of formless bottom concrete, or 17%, was estimated as low as \$6.50 per yard, and the balance of 83% was all estimated at \$8.00, \$10.00 and \$12.00, plus a contingency item of 25%.

PAGE 5393:

MR. GREGORY - Do men work as well for a Government commission as for a contractor?

MR. CHADWICK - No, I do not think they do.

Dr. Hatcher was not the speaker even at any time.

[illegible]

8.50 was for plain newspaper and \$12.00 for religious.

10-10-68

As previously stated, in connection with the company's operations on the
 1934-35 season, the following was received from the company's records in the
 form of a letterhead memorandum, dated and captioned as follows:
 "The following information is being furnished to you for your information
 and use. It is based on the records of the company and is not intended
 to constitute a contract or any other agreement. It is subject to change
 without notice and is not to be used for any purpose other than that
 for which it is furnished. It is not to be distributed to any other
 person without the written consent of the company."

Produced by the
National Archives and Records Administration

1. The first part of the document is a list of names and addresses, which appears to be a directory or a list of contacts. The names are written in a cursive script, and the addresses are listed below them. The list includes names such as "John A. Smith", "John B. Smith", "John C. Smith", "John D. Smith", "John E. Smith", "John F. Smith", "John G. Smith", "John H. Smith", "John I. Smith", "John J. Smith", "John K. Smith", "John L. Smith", "John M. Smith", "John N. Smith", "John O. Smith", "John P. Smith", "John Q. Smith", "John R. Smith", "John S. Smith", "John T. Smith", "John U. Smith", "John V. Smith", "John W. Smith", "John X. Smith", "John Y. Smith", and "John Z. Smith".

In this connection it might be interesting to ascertain how the contractors on the Welland Ship Canal found conditions during the war, and how they are finding them at the present time. The position of a contractor on the Niagara work would not be in any degree different from the situation of the contractors on the Ship Canal, and his working force would not show any more efficiency, energy and co-operative spirit than the working forces of the Welland Ship Canal contractors. At the present time, we appear to be getting better results out of our "government" labor than the privately controlled labor of the B. E. Steel Corporation, for instance.

PAGE 5326:

COPY

MR. CHADWICK - The impression there was that the work was extravagantly carried on as far as plant was concerned. They could have almost anything in the way of plant or equipment they chose to ask for. That is what my own men told me.

About the only thing we could get when we wanted it was plant and equipment, and even that was often months later than the definite promise of delivery, and was a mixture of bad material and bad workmanship when it finally arrived. Mr. Chadwick's men were on the job during the period of the rush schedule, when the work was admittedly over-planted, and for a good and sufficient reason, which was to make good the lost 12 months of working schedule which obtained during the previous period of operations, but even so the percentage of contractors' plant investment was only 12 to 15%.

PAGE 5397:

MR. HANEY - What is your practice in rushing your work?
Do you rush it at the beginning or at the end?

MR. CHADWICK - We try to schedule our jobs all through. As soon as anything runs a day behind schedule we get after it so that there is never any rush operation on the work.

As previously stated, any sensible construction man would do the same thing, and the only schedule under which it was ever possible to operate, namely, the schedule drawn up in the early fall of 1920, was checked and adhered to just as Mr. Chadwick states.

PAGE 5398:

COPY

MR. HANEY - Or would you think it better to wait until near the end of the work and then buy a tremendous amount of plant to finish it up in a hurry?

MR. CHADWICK - No, we buy our plant at the start. If we have to buy any plant during the progress of the work it is due to the fact that somebody has made a mistake.

In asking this question Mr. Haney has made a misstatement of facts. At the time the plant he mentions was bought, not a yard of concrete had been placed in the power house, gatehouse, canal or intake; only 22% of the rock had been excavated from the canal; and only 50% of the overburden had been removed. It is manifestly incorrect, therefore, to say that this "tremendous amount of plant" was bought "near the end of the work".

Without casting any reflection whatever upon Mr. Chadwick, it may be fair to state that no piece of work he has ever scheduled or planted has required anything more than two or three railroad type shovels, and a few derricks, concrete mixers and dinkys, with the usual complement of small

tools, such as drills, track jacks, pinch bars, picks and shovels, etc. The first Cedars job, with 8 railroad shovels as the main item of plant, appears to have been the largest piece of work yet handled by the Fraser-Brace Company.

(Signed) H. G. Acres

HYDRAULIC ENGINEER.

Mr. J. Allan Ross

While I do not desire to discuss the matter in the press by meeting the criticism as it should be met, I feel it a duty to draw it to your attention and to tell you that I have no objection to its being published in the **COPY** of the *Engineering Record*, as practically all of those concerned are graduates of the Faculty of Applied Science in the University, of which I have the honor to be Dean.

Not only is it not fair to imply that those senior members - those who are in a large measure responsible for the design and execution of the various hydro electric power works - are young and inexperienced. It must be recognized by anyone desiring to criticize on this score that Hydro Electric Power Engineering is comparatively new; I myself saw its inception and was engaged in the first work of this kind commencing at Niagara Falls in 1880, though it was not until ten years later that two large Niagara works were constructed in the American zone.

Practically all of the senior members of the Dominion's power plant

...and as the ...
...the ...
...the ...

(Signed) H. G. ADAMS

COPY

were completed on the Niagara lower works during March & 30th April, 1920.

experience in the design, construction and operation of hydro electric plants.

Dear Mr. Drury:-

in these and later projects both in Canada and the United States.

I have noticed an article in the "Financial Post" of Toronto in the Chief Engineer, a graduate of Toronto in Electrical Engineering in 1903 was the issue of 17th April entitled "Government following same course in regard to Hydro". For some time in those early years with the Electrical Post

The tenor of the article is in the nature of criticism of the ability of the engineering staff of the Hydro-Electric Power Commission in connection with the power work throughout the province and particularly refers to what is known as the Chippawa Scheme.

experience at Niagara Falls on

While I do not desire to discuss the matter in the press by meeting the criticism as it should be met, I feel it almost a duty to draw it to your

attention and to tell you that I think the implied criticism unjust to the senior members of the engineering staff of the Commission, especially as

practically all of those concerned are graduates of the Faculty of Applied Science in the University, of which I have the honor to be Dean.

Not only is it not fair to imply that these senior members - those who are in a large measure responsible for the design and execution of the various hydro electric power works - are young and inexperienced. It must be recognized by anyone desiring to criticize on this score that Hydro Electric Power Engineering is completely new; I myself saw its inception and was engaged in the first work of this kind commencing at Niagara Falls in 1892, though it was not until the years 1901-1905 that the large Niagara works were constructed on the Canadian side.

Practically all of the senior members of the Commission's present staff

CHIEF, LINDA MARR

1944

I have noticed no change in the "Standard" of living in the town of New York during the past few years. The same old standard of living is in the hands of the same old people. The same old standard of living is in the hands of the same old people. The same old standard of living is in the hands of the same old people.

[illegible]

On the Canadian side,

1. The Commission has the honor to acknowledge the receipt of your letter of the 10th of June, 1908, in relation to the above-mentioned matter.

were engaged on the Niagara Power works during these periods and obtained their experience in the design, construction and operation of hydro electric plants in these and later projects both in Canada and the United States. Mr. Gaby, the Chief Engineer, a graduate of Toronto in Electrical Engineering in 1903 was engaged for some time in those early years with the Electrical Development Co., both at Niagara Falls and Toronto and has had a very large electrical experience since. Mr. Acres and Mr. Sauer, the mechanical engineers, both graduates of Toronto in Mechanical Engineering in 1903 and 1901 respectively, obtained their first experience at Niagara Falls on the power works in those years and have been engaged in similar work ever since. Mr. Goodwin, in charge of construction of the Chippawa Scheme, is a graduate of Toronto in Civil Engineering in 1892 (my own year), has been engaged in Niagara Falls Power and similar works on the outside construction side practically ever since graduation and is acknowledged to have wide experience and ability in actual construction methods. Mr. Brandon, the Electrical Engineer, of the Commission, is a graduate of Toronto in Electrical Engineering in 1901 and has since seen continuous service in large power engineering on the electrical side in the Niagara Falls power works and elsewhere. So with Mr. Hogg, the Hydraulic Engineer, who is a graduate of Toronto in Civil Engineering in 1907, although he along with nearly all of the foregoing was engaged before that time with me on the original construction of the Ontario Power Company's development during the years 1901-1906.

I hope you will pardon this lengthy letter in this matter but as I said before I felt it my duty as so concerned with the education and success of our Canadian Engineers who are graduates of the Provincial University, to draw these

1900

1. The first group of people who are considered to be "highly motivated" are those who are highly motivated by the prospect of a large financial reward. This group is often referred to as "highly motivated by money" and is typically found in the financial services industry.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

Yours faithfully,

(BGD.) C. H. MITCHELL.

1991

The Hon. E. C. Drury,
Premier of Ontario,
Parliament Buildings,
TORONTO, Ont.

COPY

was abandoned on March 1944 and the material turned to the Germans. The material
aboard of the ship was recovered during the following months by Japanese.

2523

There is a great deal of interest in the subject of the
of the great power of the human mind.

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APPENDIX 2.PERFORMANCE OF RAILROAD TYPE SHOVELS
UNDER WORKING CONDITIONS

This appendix includes extracts from the engineer's daily reports and notations of statements made by the runners who were operating these shovels at the times to which references are made. These notes cover conditions obtaining on the whole territory between Portage Road and Bowman's Gully.

SHOVEL NO. 3:

In the second cut -- station 275 to 271.

This shovel worked during February and March, 1919, day shift. The cut was abandoned on March 18th and the shovel moved to the forebay. The material ahead of the cut was removed during the following months by dragline.

Extracts from daily reports, March 1st to March 19th:

DATE	C.Y. REMOVED (CAR YARDAGE)	REMARKS AND DELAYS
Mar. 1	944	3/4 hr. car off track; 5/4 hr. waiting for cars
" 3	1,136	
" 4	448	2 hrs. car off track; 1 hr. delay in water; 1/2
" 5	-	1/2 hr. repairing blocks
" 5	-	No work
" 6	560	1 hr. waiting for cars; 1 hr. car off track.
" 7	288	6 hrs. moving and pumping.
" 8	592	
" 10	368	7 hrs. waiting for stone.
" 11	320	
" 12	464	

as the basis for their operations and plans. They also used every available

1. *Chrysomelidae* (1000)

4. THEOREM 1.1 (see [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837,

1. The above information was obtained from the following sources:

Estimate the value of β by using the following information:

Time	Activity	Time	Activity
11:00	5 hrs. waiting for scene.	11:00	5 hrs. waiting for scene.
11:15	1 hr. waiting for scene; 1 hr. out of frame.	11:15	1 hr. waiting for scene; 1 hr. out of frame.
11:30	3 hrs. moving and pumping.	11:30	3 hrs. moving and pumping.
11:45	No work.	11:45	No work.
12:00	1 hr. repeating block.	12:00	1 hr. repeating block.
12:15	1 hr. out of frame; 1 hr. waiting for scene.	12:15	1 hr. out of frame; 1 hr. waiting for scene.
12:30	5 hrs. waiting for scene; 5 hrs. out of frame.	12:30	5 hrs. waiting for scene; 5 hrs. out of frame.

Appendix 2 2.

1918 on day C.Y. REMOVED

DATE (CAR YARDAGE)

REMARKS ON DELAYS

Mar. 13	352	daily reports, 245 hrs. moving 245 to 300th St.
" 14	480	
" 15	592	
" 17	240	
" 18	-	Dismantling

Note: No remarks are given for days where delays are not indicated. Difficulty in this material, however, is clearly shown by comparison of yardages for those days where delays are explained.

SHOVEL NO. 5: (Caterpillar Traction, Type 12-B)

In top out - station 275 to 292. Day shift October and November, 1918.

This shovel was structurally adapted to soft ground digging and was working in out from two to seven feet deep.

Extracts from daily reports:

C.Y. REMOVED

DATE (CAR YARDAGE)

REMARKS ON DELAYS

Oct. 28	58	8 hrs. repairs; 1 hr. moving back.
" 29	-	10 hrs. repairing.
" 30	-	6 hrs. repairing hoisting engine; 2 hrs. moving in quicksand.
" 31	-	10 hrs. jacking out of quicksand.
Nov. 1	190	
" 2	260	4 hrs. waiting wagons
" 4	-	10 hrs. putting in new piston
" 5	230	5 hrs. stuck in quicksand
" 6	-	10 hrs. blocking out of quicksand
" 7	-	10 " " " " "
" 8	275	2 hrs. waiting on wagons; 3 1/2 hrs. getting out of quicksand
" 9	240	3 1/2 hrs. waiting on wagons; 2 1/2 hrs. shut down on account of rain.

SHOVEL NO. 3:

In first out - station 290 to 310. This shovel went in on October 19th.

Appendix A, page 12

DATE	TIME	DESCRIPTION
Oct. 12	8:00	1 hr. moving
" 13	4:00	
" 14	8:00	
" 15	8:40	
" 16	-	Dismantling

Notes: The above are given for the purpose of showing the work done on the project. It is not intended to show the amount of work done, but only the nature of the work.

Summary of Work Done on Project

The work was done in three parts. The first part was the dismantling of the old machine. The second part was the moving of the machine to the new location. The third part was the re-assembly of the machine.

COPY

in out from two to seven

Summary of Work Done on Project

DATE	TIME	DESCRIPTION
Oct. 16	8:00	1 hr. moving; 1 hr. moving back
" 17	-	10 hrs. repairing
" 18	-	1 hr. repairing; 1 hr. moving
" 19	-	10 hrs. repairing
" 20	-	10 hrs. repairing out of disassembly
Nov. 1	1:00	4 hrs. waiting repairs
" 2	2:00	10 hrs. waiting in new position
" 3	-	6 hrs. waiting in disassembly
" 4	3:00	10 hrs. repairing out of disassembly
" 5	-	10 " " "
" 6	-	10 " " "
" 7	-	10 " " "
" 8	-	10 " " "
" 9	-	10 " " "
" 10	-	10 " " "
" 11	-	10 " " "
" 12	-	10 " " "
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" 21	-	10 " " "
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" 23	-	10 " " "
" 24	-	10 " " "
" 25	-	10 " " "
" 26	-	10 " " "
" 27	-	10 " " "
" 28	-	10 " " "
" 29	-	10 " " "
" 30	-	10 " " "
" 31	-	10 " " "

Summary of Work Done on Project

The work was done in three parts. The first part was the dismantling of the old machine. The second part was the moving of the machine to the new location. The third part was the re-assembly of the machine.

Appendix 2 3.

1918 on day shift.

Extracts from daily reports, week of October 19th to October 26th:

DATE	C.Y. REMOVED (CAR YARDAGE)	REMARKS RE DELAYS
Oct. 19	160	
" 21	324	
" 22	-	10 hrs. putting shovel on track
" 23	368	8 hrs. putting rock under shovel
" 24	1,040	6 hrs. putting stone under shovel
" 25	96	7 hrs. shovel off track; $2\frac{1}{2}$ hrs. waiting for crushed stone
" 26	240	Delayed, soft bottom.

Information furnished by shovel operator:

On the evening of the 26th, the shovel was in such danger of being lost that two locomotives were called out at quitting time and it required the combined efforts of these locomotives together with the shovel traction helped by pushing with dipper arm, to restore shovel to a position of safety. During a portion of this period it required about 32 cars of crushed stone to enable the shovel to dig its own length.

SHOVEL NO. 7:

In cut station 324 to 332. This shovel worked during summer and fall of 1917 in cut just south of Bowman's Gully on day shift.

Extracts from daily reports:

DATE	C.Y. REMOVED (CAR YARDAGE)	REMARKS RE DELAYS
Oct. 8	800	5 hrs. moving in quicksand
" 9	112	7 hrs. quicksand; 2 hrs. moving back
" 10	300	5 hrs. moving

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818

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Page	Text	Page	Text
10	Believed, soft bottom.	10	Believed, soft bottom.
11	original bottom	11	original bottom
12	7 feet, gravel and sand, 15 feet, water	12	7 feet, gravel and sand, 15 feet, water
13	2 feet, water, 15 feet, water	13	2 feet, water, 15 feet, water
14	1 foot, water, 15 feet, water	14	1 foot, water, 15 feet, water
15	1 foot, water, 15 feet, water	15	1 foot, water, 15 feet, water
16	1 foot, water, 15 feet, water	16	1 foot, water, 15 feet, water
17	1 foot, water, 15 feet, water	17	1 foot, water, 15 feet, water
18	1 foot, water, 15 feet, water	18	1 foot, water, 15 feet, water
19	1 foot, water, 15 feet, water	19	1 foot, water, 15 feet, water
20	1 foot, water, 15 feet, water	20	1 foot, water, 15 feet, water

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COPY

On the evening of the 15th, the Navy was informed that the ship was on the way to the coast.

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED DATE 08-11-2010 BY 60322 UCBAW/STP

with the intent to use the collected information to promote religious

Amount in millions	100	100
Amount in millions	100	100
Amount in millions	100	100

Appendix 2*..... 4.

DATE	C.Y. REMOVED (CAR LOADAGE)	REMARKS AND DELAYS
Oct. 11	1,008	
" 12	-	Rain
" 13	1,200	30 minutes, shovel off track
" 15	640	2 hrs. cable repairs; 2 hrs. quicksand
" 16	400	7 " lost account of quicksand
" 17	432	7 " " " " "
" 18	448	4 " quicksand; 3 hrs. repairs
" 19	-	Rain
" 20	672	8 hrs. 40 minutes quicksand
" 22	576	6 hrs. 15 minutes quicksand
" 23	-	Rain
" 24	-	"
" 25	-	"
" 26	528	3 hrs. quicksand; 3 hrs. break-down
" 27	268	3 hrs. " 5 hrs. moving
" 29	-	5 hrs. throwing track; 5 hrs. rain
" 30	192	8 hrs. bad track
" 31	400	7 " " " " "
Nov. 1	496	6 " 30 minutes, bad track
" 2	416	7 " bad track

Information furnished by shovel operator:

During a portion of this time the shovel was carried on a grillage of four layers of trees laid flat on which was placed two or three layers of ties. The loading track itself was blocked up on successive layers of ties as the original track disappeared in the quicksand.

Note: The work during 1917, 1918 and 1919 was confined principally to the district north of Lundy's Lane.

The experience gained during this early period of the work was made use of in reference to the extension of digging operations in earth to the south after that time. Consequently, there is only occasional reference in later reports to trouble due to soft bottom in connection with the use of railroad type shovels, by reason of the fact that whenever such conditions were

[illegible][illegible]

Information furnished by show-I operators:

1. The first of these is the fact that the United States has a large and growing population of Negroes, who are in a position to make a valuable contribution to the country's economic and social development. It is therefore essential that the Government should take steps to ensure that they are fully integrated into the mainstream of American life.

Notes: The work during 1947, 1948 and 1949 was seasonal, principally in the period of the "bush" or "bush" season.

It is not possible to say whether the above is a true or false statement. The statement is a generalization and cannot be proven true or false. It is a statement of opinion or belief.

Appendix 2 5.

encountered, the program for these shovels was immediately altered, and the equipment was raised up to shallow cutting or removed to localities where conditions were less severe.

Approximate work done for the first month, which was 44 days, was as follows:

The first excavation was commenced on July 24, 1941, and the last in September, 1941.

These trenches were built as conditions developed and as they were needed.

They were also built as needed for the disposal of the material and eight trenches of average length of 2,100 feet at the landing for the disposal.

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January 1, 1900

enclosed, the papers for these animals are herewith returned, and the
equipment was taken to the station where it was removed to the station where
condition was last covered.

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APPENDIX 3.

TRESTLE CONSTRUCTION

Arrangements were made for the first trestle, which was at the main disposal, on March 1st, 1919.

The first construction and expenditures were made in March, 1919, and the last in September, 1921.

These trestles were built as conditions developed and as they were needed.

There were six trestles averaging 2,200 feet long each at the main disposal and eight trestles with average length of 2,100 feet at the Lundy's Lane disposal.

MAIN LANE DISPOSAL - 1919-1921.

1,700,000 cubic yds. excavated	187.00	-	2
7,000 yds. fill	1.00	-	-
100,000 yds. gravel	1.00	-	-
500,000 yds. gravel	2,000.00	-	2000
FOR TOTAL DISPOSAL FOR MAIN DISPOSAL	2,187.00	-	2002

TOTAL LENGTH FOR ALL TRESTLES, MAIN DISPOSAL 12,000 ft.
 Average length 2,000 ft.
 TOTAL LENGTH FOR ALL TRESTLES, LUNDY'S LANE DISPOSAL 16,800 ft.
 Average length 2,100 ft.

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1000 17th Street, N.W., Washington, D.C.

Investigation was made for the first results, which was at the main

disposal, on March 1st, 1919.

The first investigation and expenditures were made in March, 1919.

and the last in September, 1921.

These results were made as a preliminary investigation and on that date

investigation.

There were six results averaging 2,100 feet long each at the main

disposal and six results averaging 2,100 feet at the main disposal.

Less disposal.

There were four in APPENDIX 3.

"What was Total MFBM in Trestles, Total Cost,
Cost per MFBM, and Cost of Trestles,
per Cubic Yard of Disposal?"

MAIN DISPOSAL - 6 TRETTLES

TIMBER AND PILING	TOTAL COST	COST PER UNIT	TOTAL C.Y. DUMP EQUIV. BANK MEASUREMENT	COST OF TRESTLE PER C.Y. OF DUMP
816,281 MFBM	135,402.78	166.00	-	-
126,723 l. ft. rd.	64,648.47	.512	-	-
	200,051.25		6,114,162	3.25¢
For entire capacity at existing levels for same trestles			16,114,162	1.25¢

MUNDY'S LAKE DISPOSAL - 8 TRETTLES

1,749,164 MFBM	221,951.00	127.00	-	-
7,539 l. ft. rd.	7,594.17	1.00	-	-
	229,535.17		3,795,204	6.05¢
For entire capacity for same trestles			5,435,204	4.2¢

Total length for all trestles, main disposal 13,200 ft.

Average height 47 "

Total length for all trestles, Montrose dump 16,800 ft.

Average height 35 "

Appendix B 2.

There were four stringers for tracks, each 12" x 14" x 40' and lapped every third bent - bents 13' centres.

All stringers were salvaged, in addition to complete bents that were not used.

The dumps so created by these trestles are capable of taking 10,000,000 more cubic yards at the main disposal and 1,640,000 cubic yards at Lundy's Lane without any additional expense for trestles.

The Lundy's Lane disposal was made necessary on account of congestion on the main line track due to concentration of excavating equipment opposite that disposal, and on account of tracks being at the same time heavily taxed for concrete requirements for lining, all of which resulted from delays in delivery of shovel equipment and abnormal conditions of wet excavation.

Appendix 3

There were two stores for the purpose, each 12" x 12" x 12" and each
every third bent - bent in the center.
All specimens were subjected to analysis in duplicate from each
not used.

The groups are divided by three levels and each of them 12,000,000
more cubic feet of the main diagonal and 1,000,000 cubic feet of the
line without any additional material for the material.
The group's main diagonal was made necessary by means of expansion
on the main line from the to construction of construction equipment
that diagonal, and as a result of the main line being bent
for construction equipment for the main line which resulted from the
delivery of the main diagonal and the main diagonal of the material.

COPY

Appendix 4 B.

The length overall for **APPENDIX 4.** is about 33 ft. and 6 inches

THE PROPOSAL THAT THE HYDRO-ELECTRIC POWER COMMISSION SHOULD HAVE USED THE RAILROAD TYPE STEAM SHOVELS, SERVED BY FLAT CARS WITH HINGED SIDE DOORS - 25 CARS PER TRAIN, USING STEAM LOCOMOTIVES UNDER THE CONDITIONS OF A CONTROLLING GRADE 1/2 of 1%, AND UNLOADING AT THE DUMPS WITH PLOWS.

Ten shovels there should be ten loading per shovel.

SHOVELS:

is estimated that the shovels and plows are used, each shovel

For purposes of discussion, it will be assumed that a 78-C Bucyrus shovel fills the specifications for shovel equipment. Ten of these shovels, having an average capacity of 2,000 cubic yards of earth per ten hours, would about equal the estimated capacity of the original equipment actually provided for this work.

COPY

The two shovels will be one right hand and one left hand.

CARS:

There are 25 cars per train and 11 trains.

The cars are assumed to be flat cars with hinged side doors, and since it had been suggested that the Hydro-Electric Power Commission should have used the maximum size of standard car available, it is taken to mean that the size proposed should have about 30 cubic yards capacity. A car of this capacity, however, will have to have a floor space of 34' x 9' in order to take a load of 30 cubic yards of dry material, with slopes of 1 1/2:1, and will weigh very close to 30,000 lbs.

It will therefore be assumed that the capacity is 30 cubic yards and the weight will be taken as 30,000 lbs. for each car. (A standard flat, without side doors, 36'10" long on the floor weighs 24,800 lbs.)

Appendix 4 2.

The length overall for the proposed car will be about 39 ft. and a train of 25 cars including engine, will be over 1,000 ft. long. This length of car will be hard to keep on the track when curves may reach 30° as is often necessary for construction purposes.

For ten shovels there should be two trains per shovel, and with the spares, a total of approximately 600 cars necessary, as the number of cripples is excessive where unloaders and plows are used, even where the material is dry and free-flowing, like gravel.

PLOWS AND UNLOADERS:

At the disposal ground there should be two plows and one unloader for each shovel, in order to avoid delays of waiting for this sort of equipment.

The two plows will be one right hand and one left hand, or, say, 22 plows in all for 10 shovels and 11 unloaders.

The above represents the equipment directly connected with excavation and does not include any provision for auxiliary needs, as hoists, wrecking cranes, other locomotives and cars, snow-plows, pumps, etc.

TWO CONTROLLING CONDITIONS - (A) and (B):

(A) - It may be fairly conceded that the choice of location for the main disposal area was the most logical and suitable, especially in consideration of the requirements that such a ground should have to meet. A disposal area for this work, that will satisfactorily fill all requirements, should have the following principal characteristics:

Appendix 4 2.

The length overall for the proposed car will be about 30 ft. and a train of 10 cars including engine will be over 1,000 ft. long. This length of car will be used for both on the main line and on the branch line as it is often necessary to use the same car for both purposes.

The two main lines should be two tracks per track, and also the branch, a total of approximately 100 cars necessary, as the number of cars in a train varies with the load and also the nature of the material to be hauled. The cars should be of the following types: open-top, covered, and flat-bottom, also tank cars for oil and other liquids.

At the disposal ground:
At the disposal ground there should be two tracks and one car for each track. In order to make it possible to bring to this point of disposal the two cars will be one right hand and one left hand, or, say, 10 ft. apart in all the tracks and in the disposal ground.

The above represents the equipment which is necessary for the disposal of the material. The equipment for the disposal of the material is as follows: open-top, covered, and flat-bottom cars, also tank cars for oil and other liquids.

The disposal ground:
(a) - It may be easily assumed that the design of the disposal ground will be such as to make it possible to bring to this point of disposal the two cars will be one right hand and one left hand, or, say, 10 ft. apart in all the tracks and in the disposal ground. The above represents the equipment which is necessary for the disposal of the material. The equipment for the disposal of the material is as follows: open-top, covered, and flat-bottom cars, also tank cars for oil and other liquids.

Appendix 4 3.

- 1 - Convenience to the centre of gravity of the excavation.
- 2 - Suitable depth to provide for the maximum practical spoil per unit of area, avoiding frequent track shifting, etc.
- 3 - Sufficient area to provide for the disposition of approximately 17,000,000 cubic yards of excavated material.
- 4 - Accessibility.
- 5 - Minimum first cost and minimum prospective damages to adjoining properties.

The area as selected is less than two miles from the main line of the construction railway (parallel to the canal) and about four miles from the centre of gravity of the total excavation.

It has an average depth of 65 ft. over an area of 200 acres thus providing ample space for at least 18,000,000 cubic yards of excavation.

It is accessible from the main line of the construction railway without crossing any of the existing steam or electric railways, and its location provides for a safe operating gradient for the disposal railway leading to it.

The land on which the disposal is located was for the greater part undeveloped and contiguous to similar properties.

Drainage is excellent and no claims for damages have been made to date.

(B) - It will also be seen that with 150 to 200 train movements per day across the Grand Trunk, Michigan Central, Babash, and Niagara, St. Catharines and Toronto Railways, grade crossings with these roads were out of the question.

all cases in which the

I am convinced that the results of the investigation

This work was supported by National Institute of Health Grants R01 AG-07689 and K23 AG-00092.

also, perhaps, more than 100 years ago.

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WILLIAMS - 4

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...nel tempo...

As soon as a complaint is received, the following steps are taken:

the next morning found the boat (1000 lbs) empty and the

...entirely in accordance with the instructions of the ...

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It is possible that the above-mentioned results are due to the fact that the sample size is small.

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...the fact that the ...

The fact on which this demand is based was not the primary one in-

...self-reported volume of smuggling has declined

There is a significant and positive correlation between the two variables.

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Appendix 4. 4.

Of these crossings the Wabash was the least active, with a regular service of 14 to 15 trains per day, and during the war, an extra traffic of about 15 war special passenger trains per week.

Upon examination of the profile of the disposal railway connecting the main line of the construction road with the disposal grounds and restricted by the controlling conditions (A) and (B) of railway crossings and dump location, it will be fairly established that, to reach the disposal area with 1/2 of 1% grade would be an impossibility on practical and economical grounds, especially when the grade is against the loaded traffic.

This ruling grade would also be a condition prevailing on north and south-bound traffic on the main line tracks, as undoubtedly it would frequently be necessary to operate loaded trains in either direction.

The profile of the ground, together with the location and grades of the railroads crossing the canal and construction railway, will show that to establish this gradient would involve excessive cuts and fill both north and south of Landy's Lane and result in difficulties in making connections to service and loading track along the canal.

Again, with shovels working south from the forebay, it is taken, that, in order that the shovels may work to their maximum depths in cuts, both the leads to the main line and the loading tracks are on 1/2 of 1% grade or equivalent. The building of zig-sag lines up the slopes does not appear to be practical, considering that there are ten shovels working all in the same direction and at all points along the line, and when the trains to be handled are over 1,000 ft. long.

◆ ◆ ◆ ◆ ◆

not special passenger trains per week.

Upon examination of the profile of the proposed railway connecting the
east side of the International road with the district grounds and connected
by the proposed easement (A) and (B) of railway crossing and they have
been, it will be fairly established that, the proposed railway crossing (A)
of the International road is an improvement in general and estimated to be, as
previously shown the grade is against the loaded traffic.

This ruling would also be a significant reversal of the

be necessary to operate Israeli troops in other directions.

service and loading took along the canal.

...the

are over 1,000 ft. long.

Appendix 4 5.

Shovels working in this way are in the first place operating against drainage and in the second place, will reach their limit of depth of excavation at about 25 ft. below ground for the loading tracks at approximately station 340, or at the north side of the Whirlpool Gully.

Below this depth the grade of $1/2$ of 1% will strike rock formation near station 390 and it would be impossible to locate a loading track elsewhere to serve a shovel at that station and at that depth of cut. Neither is there room to switch a 1,000 foot train even on zig-zag tracks, in order to reach the main line.

Between station 210 and 240 it would be impossible to get out with a 1,000 foot train, with cars loaded by shovels having a 10 foot range between shovel and loading track. **COPY** At these and other points where rock surface projects it would become necessary to increase the grades and load short trains.

To start a 25 car train loaded with 30 cubic yards on each car, requires a draw-bar pull of at least 56,000 lbs. shown by the analysis given below.

The weight of 30 cubic yards of excavation is approximately 40.5 tons and the car 15 tons. A full train of 25 cars will be over 1,400 net tons. With loading track on $1/2$ of 1% grade and dirt on the rail, to start the train will require not less than 40 lbs. of draw-bar pull for each net ton of train load (cars and loads included) or a total draw-bar pull of 56,000 lbs.

With an adhesion co-efficient of 23% this calls for a weight of 254,545 lbs. on the drivers of the locomotives or approximately 127 tons, which is a weight far beyond the safe loading limit on construction tracks at dumps and shovels.

Approved: _____

Shovel is to be used in the first place to excavate
material in the second place, with shovel and
at about 10 ft. below ground for the purpose of excavating
200, or at the north side of the Whitcomb Valley.

Below this depth the grade of 1/2 or 1/3 will strike rock formation near
station 200 and it would be impossible to dig a loading track
to serve a shovel at that station and at that depth of cut. Therefore it is
proposed to put in a 1,000 foot track over the existing tracks, in order to reach
the main line.

Between station 100 and 200 it would be impossible to put in a
1,000 foot track, with cars loaded by shovel and shovel
shovel and loading track. It would be impossible to put in a
1,000 foot track between the station and the main line.

To reach a 10 car train (loaded with 100 tons) on the main line
a 1,000 foot track at station 100, shown by the analysis given below,
The weight of 10 cars loaded with 100 tons is approximately 40,000 tons and
the car is 10 tons. A full train of 10 cars will be about 1,000 tons. When

loaded with 100 tons of 1/2 or 1/3 grade and 100 tons of 1/2 or 1/3 grade
the weight of 10 cars loaded with 100 tons is approximately 40,000 tons and
the car is 10 tons. A full train of 10 cars will be about 1,000 tons. When

loaded with 100 tons of 1/2 or 1/3 grade and 100 tons of 1/2 or 1/3 grade
the weight of 10 cars loaded with 100 tons is approximately 40,000 tons and
the car is 10 tons. A full train of 10 cars will be about 1,000 tons. When

Appendix 4 6.

These long trains also entail extensive trackage, requiring long tail tracks both at shovels and dumps.

The conditions under which the proposed units could be utilized may be given in general as follows:

1. That the material excavated is dry and will load on cars with slopes of $1\frac{1}{2}$:1.
2. That the dump or disposal tracks are on tangents, in order that the unloader and plows will work.
3. That unusually long tracks are needed both at dump and to provide for switching, routine of handling unloader and plows, and loading and unloading.
4. That an average of at least 60 minutes would be needed to unload and release train at the dump, the details of which are given in the following statement:

COPY

TIME

- | | |
|---|-----------|
| (a) - Upon arrival of the train at the disposal, it is coupled to the plow standing on its spur | 3 minutes |
| (b) - The engine uncoupled and goes for unloader standing on its spur | 5 " |
| (c) - Engine and unloader return and coupled to train | 3 " |
| (d) - Train moved so that unloader is under the cable arm or anchor and cable attached to arm | 5 " |
| (e) - Train moved forward unreeling cable until plow is opposite arm and cable attached to plow | 5 " |
| (f) - Train taken to dump | 5 " |

$$2' \quad 12345 \rightarrow \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2}$$

These are the same as the ones in the previous section.

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

The journal's pages will be filled up by the end of the year.

1. That the material produced is not and will never be used in any way.

..f: 11 20 1941

1. The first two are the most common and are the most important.

Since life really had become so

1. The monthly maintenance fee shall be \$100.00.

and the patient has only the relative freedom to accept, postpone or

Y903

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... ..

release train at the drug, the details of which are given in the following

8. 求函数 $y = \sin x$ 的导数。

1557

At 44, $\text{J}(\text{m}^2 \text{m}^{-2})$ was 16.1 and $\text{I}(\text{m}^2 \text{m}^{-2})$ was 1.41.

[illegible]

valuation of the new line segment edges will be

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1

***** KINETIC OF $\text{Fe}(\text{OH})_3$ AND $\text{Fe}(\text{OH})_2$ PRECIPITATION IN AQUEOUS SOLUTION *****

[illegible]

***** and attached to the

only after the previous month's date - 10,

..... group of artist about - (2)

Appendix 4 7.

(g) - Train unloaded (plow now next to unloader) 20 minutes

(h) - Empties placed on siding 3 "

(i) - Plow taken to spur and cable detached from it 5 "

(j) - Unloader taken to spur 5

(k) - Engine returns and couples to empties 5

Total time 64

5. That shorter trains, heavier gradients and lighter locomotives

would be necessary to remove the entire earth cut even though it were dry.

Under this routine and system of unloading it will be very difficult to widen the dump at the deep and extreme ends of tracks, for in the first place the yardage per foot of train is smaller, the dump length per train is long, and the plow car being on the end of the train materially shortens the dump each time the track is shifted. This difficulty arises from the restriction due to the varying depths of fill and the limits to dump ground area.

To widen, it would require that the train be very frequently cut with its attendant delays due to switching out empties, etc.

Should a slide occur on the dump it could not be filled with this equipment, since it will not work when the dump track is on a curve. When the material is unloaded by plow it falls close to the rail and makes operation of train difficult and derailments frequent.

A marked increase in dump force would be needed in order to attend long trains, and for long periods in which the trains are unloading and switching.

This system of handling excavated material is restricted largely to placing ballast on main line tangents or very flat curves and making railroad

1998, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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7. *Journal of Interpersonal Violence* 19(12):1349-1362 (2004)

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***** Type of report: Unknown *****

 $\Delta_{\text{H}} = \Delta_{\text{H}}^{\text{obsd}} - \Delta_{\text{H}}^{\text{calcd}}$, and type of polymer low-temperature pattern = (A)

10-10-1944

1. The number of days, fewer problems and lighter loads

would be necessary to remove the entire wall and roof.

These data indicate that the use of the word "and" is not a simple matter of joining two ideas, but rather a complex process of relating them in a way that is meaningful to the reader. The use of "and" can be used to connect two ideas that are related in a variety of ways, such as by showing a sequence of events, a comparison, or a contrast. The use of "and" can also be used to connect two ideas that are related in a way that is not obvious to the reader, such as by showing a cause and effect relationship. The use of "and" can be a powerful tool for the writer, but it must be used carefully to avoid confusion and to ensure that the reader can follow the logic of the argument.

14-00000

the average per foot of 270 is smaller, the dump length per train is longer,

and the time for being on his way to the island.

each time the same is written. The following are the results:

(The following information was obtained from the records of the FBI.)

The witness, it would require that the train be sent forward and visit

THE UNIVERSITY OF CHICAGO PRESS

• *Staphylococcus aureus* is the most common cause of skin infections.

and, above it will not with the long time to do a better.

intended to be included in the well known collection

to assist in the investigation of the case.

① A second business in deep loss could be needed to cover its initial loss.

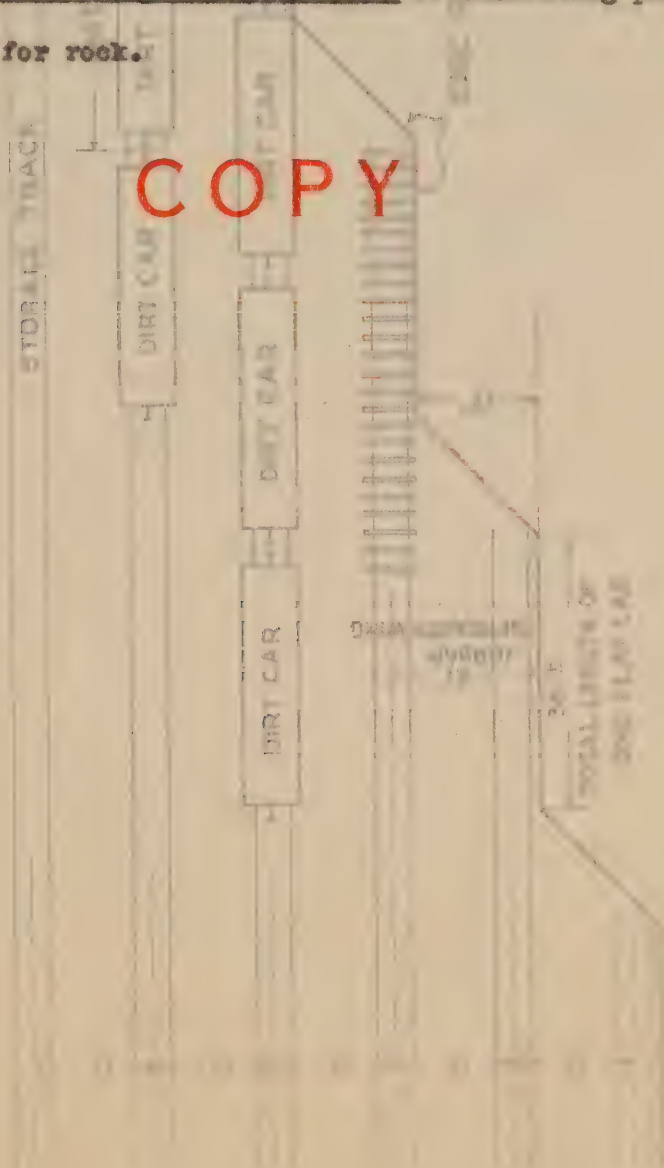
...and the long periods in which the system was not working.

This system of handling materials is highly effective in reducing the risk of injury and damage to the materials.

Appendix 4 8.

fills from the trestle where the original dump track is not moved and where the tail track is thus unlimited. It was at one time the recognized method of disposing of earth excavation only, on railroad fills, but is now generally superseded by the use of air dump cars. One company's products of dump cars are now in use on 55 prominent railroads of Canada and the United States.

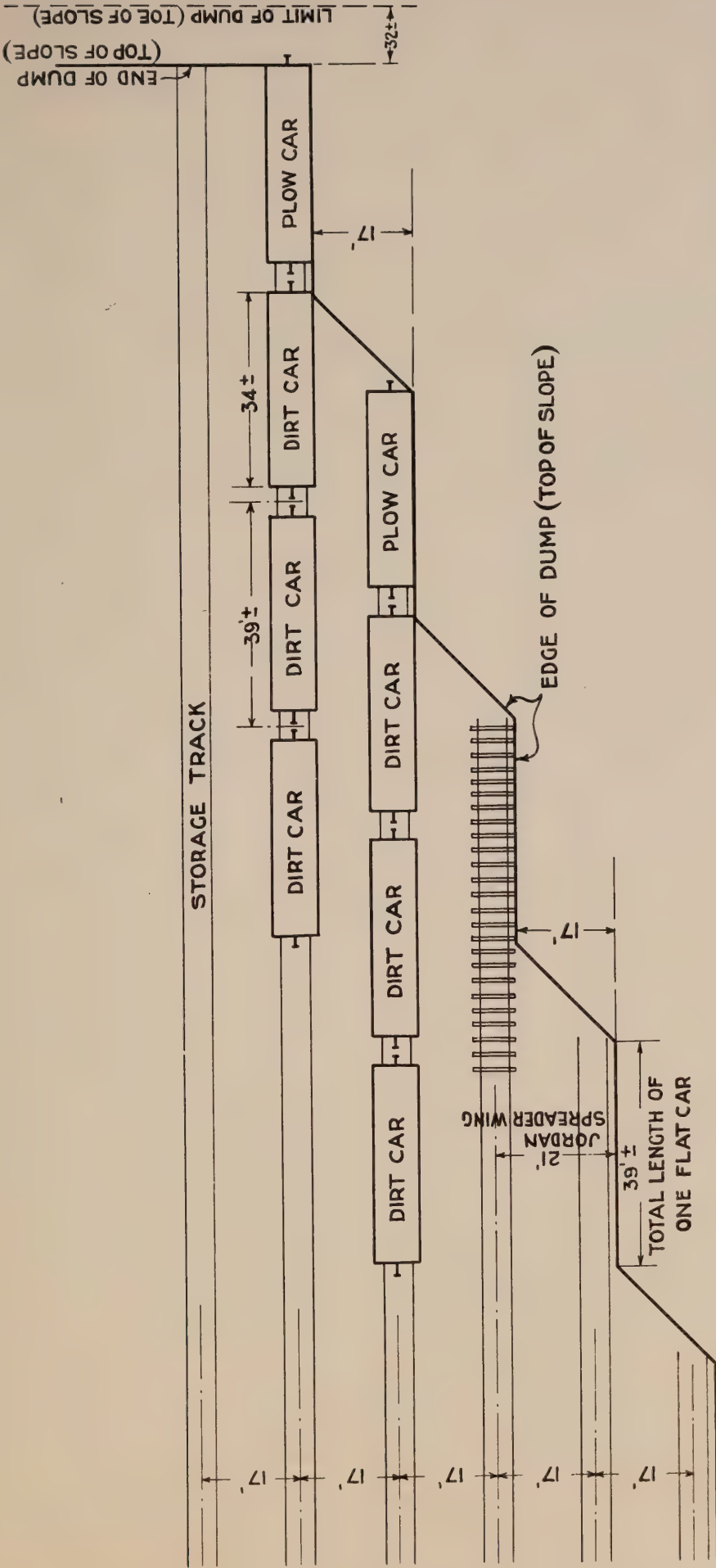
To do the entire excavation in both rock and earth on the canal would, if the earth excavation had been made as proposed, have entailed the equipping of the work with two totally distinct types of excavating plant; one for earth and another for rock.



Appendix 4 - 1900-1910

While from the records above the original thing seems to be not known and known
The full record is now available. It was at one time the recognized method
of allocating or earth movements, on national title, but is now generally
supported by the use of the deep well. The company's property at that time
was not in use as the production of oil and gas was not started.
It is the entire movement is now back and forth on the same basis.
If the earth movements had been made by the company, they would not be
of the same with the entire movement of movements clearly not the
same and would not be.

COPY



APPENDIX 4—CHART A
 PLAN SHOWING EFFECT ON
 DISPOSAL AREA BY USE OF
 LIDGERWOOD AND PLOW FOR
 UNLOADING EXCAVATED MATERIAL
 FROM FLAT CARS WITH HINGED SIDES

APPENDIX E.CONSTRUCTION POLICY, ORIGINAL PROGRAM, CHOICE
OF PLANT, AND ANTICIPATED PRODUCTION

The growth of the power demand on the Niagara System of the Hydro-Electric Power Commission was such that early in 1914 it became imperative that immediate steps should be taken to secure a further source of power, particularly on account of the fact that the construction of a hydraulic development would take from four to six years to complete, depending on the amount of power involved.

At that time, of the 66,000 cubic feet per second of the Niagara River water allotted to Canada under treaty, there remained 6,500 cubic feet per second available for the Commission. The existing operating plants were then, and are now, only recovering from 135 to 180 feet of the total 326 feet of difference between the levels of Lakes Erie and Ontario, so that with this comparatively limited amount of water it was quite clear that the continued waste of such large percentages of possible head could not be tolerated. It was therefore essential that every possible refinement of design and location should be directed toward the recovery of the last foot of head possible from the gross amount of 326 feet available.

Guided by this principle, in the comparison of the various possibilities of development, the number of feasible propositions was finally reduced to two that had sufficient merit to make them worthy of further study and analysis. These two projects were known as the Jordan-Erie project, and what has now become the Queenston-Chippawa Development.

APPENDIX

THE WATKINS J. T. & COMPANY
 THE WATKINS J. T. & COMPANY

The purpose of the present document is to present a summary of the results of the

investigation of the various factors which enter into the problem of the

development of the various factors which enter into the problem of the

development of the various factors which enter into the problem of the

amount of power involved.

It is the purpose of the present document to present a summary of the results of the

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Appendix 5 2..

In 1916 surveys of these two projects had been under way for about two years, providing sufficient soundings, borings, contours, etc., upon which to base conclusions as to the relative merits of the two proposals.

The Jordan-Erie scheme consisted in general of an open canal about 24 miles long across the Niagara Peninsula, the intake of which would be at Lake Erie near Morgan's Point, the canal discharging into a forebay on the escarpment immediately above the village of Jordan. From this forebay penstocks over a mile long (representing about 18 feet of penstock per foot of head) would lead the water to the power house situated in the valley below. The tailrace would discharge into the end of the bay at the mouth of the Jordan Creek which is at the level of Lake Ontario.

COPY

The Queenston-Chippawa proposal in general took the water from the Grass Island Pool of the Niagara River opposite the mouth of the Welland River near Chippawa, and delivered it to the Niagara River about a mile above Queenston. There were three ways to accomplish this; namely, by the use of a pressure tunnel, by a combined tunnel and canal, and by an open canal.

After careful analysis by the engineers of the Commission and consultations with eminent engineers and contractors, it was finally determined that the open canal would consistently deliver water at less loss under the varying conditions of head, than either of the other two methods, and this was adopted.

The canal scheme of the Queenston-Chippawa Development consisted generally of an intake at the mouth of the Chippawa Creek or Welland River, reversing the flow and canalizing the Welland River for about $4\frac{1}{2}$ miles, from which point an open cut in earth and channeled rock approximately $8\frac{1}{2}$ miles long, led the water

Appendix B 2.

In 1911 surveys of water for power and flood control were made by the Army and

Naval, providing additional information, hydrographic, etc., which

is being considered as to the relative merits of the two proposals.

The hydrographic survey conducted in 1911 at an interval of about 25

miles from the mouth of the Colorado River, the extent of which would be at least

this near Arizona's limit, the same distance into a canyon in the state-

was immediately above the village of Tropic. When this existing navigation was

a mile from the mouth of the Colorado River, the extent of which would be at least

lead the water to the power house situated in the valley below. The distance

would therefore be the same as the length of the Colorado River which

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is at the level of Lake Mead.

The American-English proposal in general, from the river to the power

house (top) of the Colorado River, against the mouth of the Colorado River, was

proposed, and delivered it to the Colorado River, about a mile above the power

house, with some water to be supplied from the river, by the use of a pressure

plant, by a canal, tunnel and canal, and to be used for

power, after entering the Colorado River, the Colorado River, and the Colorado

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Appendix B B.

to a forebay on the escarpment about a mile above the village of Queenston.

The width of the section of canal in rock was 42 feet with vertical channeled sides and concrete lining on the bottom. The average depth of rock cut was about 40 feet and the average depth of earth overburden was about 40 feet. The maximum rock cut was approximately 70 feet as was also the maximum earth cut. The bottom width of the section in earth was 62 feet with side slopes of $1\frac{1}{2}:1$. Sufficient data was available from the surveys to indicate that the yardage involved for a development utilizing 6,500 cubic feet per second, would be approximately 7,300,000 cubic yards of earth, 2,700,000 cubic yards of rock which included excavation in the power house, forebay, canal and screen house.

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The penstocks led directly from the forebay to the power house and were approximately 380 feet long, representing about 1.25 feet of penstock per foot of head. The tailrace from the power house discharged directly into the Niagara River at a level of about 2 feet above the elevation of Lake Ontario, giving a gross head of about 315 feet.

With the intake at the level of Lake Erie and the tailrace at the level of Lake Ontario, the Jordan-Erie scheme would appear at first sight to be the more attractive scheme, but closer studies showed that with an intake on the north shore of Lake Erie, where the prevailing wind was such that, with the induced current of the canal, large quantities of ice would be drawn into the canal, the difficulties of operation would become most serious.

There was also the question of control of about 24 miles of canal and the added difficulties of regulation of flow in penstocks over 5,000 feet long,

Phyllanthus *sp.*

1. The first of the sections of the report is the general description of the project. This section includes the title, the author, the date, and the purpose of the study. It also includes a brief summary of the findings of the study.

The position is directly across the river from the power house and was approximately 300 feet long, extending about 1.50 feet of concrete per foot of width. The bottom of the river was about 10 feet above the level of the water.

With the change of the level of Lake Erie and the influence of the Lake of Lake Ontario, the Niagara Falls system will appear as first sight to be the more attractive feature, but closer studies reveal that this is far from the case. The Niagara Falls system is far more attractive than the Lake of Lake Ontario, and the Niagara Falls system is far more attractive than the Lake of Lake Ontario.

See Index to Volume 12 for details of location of material and other notes.

Appendix 5 4.

and notwithstanding the location of the intake and tailrace being such as to give the maximum possible gross head for the plant, the net amount recoverable was only 297 feet under normal operation conditions. There also remained the very important feature of the conditions for construction. The location of the canal and works was such that these difficulties appeared of real magnitude on account of the lack of railroad facilities and good roads, and the necessity of building a considerably longer construction railroad. In the Queenston project the artificial channel was only 8½ miles long as against 24. The intake was in a location free from possible ice trouble for the greater part of the time, and while the intake was at a point 9 to 11 feet lower than Lake Erie and the tailrace about 2 feet above Lake Ontario, yet with this gross difference of elevation of about 515 feet, the net operating head, after deduction of all losses, was about 305 feet under normal conditions. This particular feature has since become even more important on account of the larger canal capacity subsequently adopted.

The conditions for construction were much more favorable insofar as railroads and better highways were concerned. The location also was closer to the banks and customs offices and was in a more closely settled district, making living conditions more convenient, and its more compact make-up resulted in considerably less construction cost for trackage and disposal of material.

It was therefore decided that the Queenston-Chippawa Development was preferable, and a definite construction problem presented itself for consideration as a result.

Specifications and sufficient general plans were prepared from which it

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1. The first of these is the fact that the Commission has not yet received any information from the Government of the United States regarding the activities of the Communist Party in the United States. This is a serious matter, and it is the duty of the Commission to investigate it as soon as possible.

[illegible]

11. *Journal of the American Statistical Association*, 1990, 85, 1039-1042.

Appendix 5 8.

could be determined whether to contract the work or to execute it under construction forces of the Commission. Contractors were invited to inspect the work, but in consideration of the magnitude of the projects and the necessity of purchasing new, heavy and special construction plant and the need of doing the work under existing war conditions, it became quite evident, in the first place, that no contractor of reputation would bid on anything but a "cost-plus" basis. Furthermore, with the possibility of additional water becoming available through the prospective purchase of the Ontario Power Company and from other sources, it seemed that there might be extensive changes and enlargements in the original plans, in which case the Commission would not have so free a hand, under contract conditions, to make these desirable changes without uncertain and perhaps unusually heavy charges for extras due to changes in plans, and the possible necessity of the contractor purchasing additional and larger units of plant. It thus became evident that ultimate economy and capital cost would be benefitted by unrestricted freedom in making changes in the design.

Another feature which presented itself was that a contractor using the ordinary type of construction plant on this work would not have the advantages of electric power which the Commission had available, and his estimates would therefore have to take into account the greater operating costs for fuel and labor, and the fact that his working season would be limited to 200 days, as against a possible 250 days or 300 days with electric plant. The ultimate economy and capital costs of the development was therefore, largely influenced by the decision of the Commission to do this work with their own construction forces. This contention was borne out in a remarkable manner, for the canal

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as built was widened about $8\frac{1}{2}$ feet and deepened a maximum of 12 feet from the original. In addition to this enlargement, the sides were concreted instead of being channeled; the forebay was enlarged and deepened, and the power house and transformer stations were ultimately made a combined building. Had these changes been made under contract it would probably have resulted in the contractor abandoning the work, entailing litigation and heavy indemnities.

Briefly, the controlling conditions which fixed the decision for the performance of the work by the construction forces of the Commission were, the availability of cheap electric power, the use of the heaviest type of excavation equipment, the comparatively convenient disposal grounds for the excavated material, and the advantages of unrestricted freedom in developing the design.

During the early part of 1916 various manufacturers of plant were invited to submit suggestions as to the suitability of the equipment they manufactured, for the work in mind. The result of these enquiries confirmed the opinion of the engineers of the Commission in the choice of the plant as finally purchased.

In general, the major units of this plant consisted of powerful, high lift revolving shovels, electrically operated, for earth and rock cuts of the canal; electric locomotives of approximately 50 tons weight; heavy duty duplex channeling machines; improved modern compressor plant, electrically operated; heavy reinforced type of 20 cubic yard air dump cars; and a high class double track electric railway for the handling of construction material and excavation.

To further confirm the judgment of the engineers in the matter of plant, visits of investigation were made to a number of large projects in the United

Appendix B 61

as well as about 100 ft. and designed a machine as it was then
outlet, in addition to this arrangement, the idea was suggested that
of being connected to the pump and designed, and the water supply
and pressure valves were adjusted with a suitable facility. The
changes have been made in order to provide for the
greater efficiency of the pump, especially in the case of the
pump, the construction of which was then the basis for the
performance of the pump by the construction of the machine now,
the possibility of using electric power, the use of the standard type of
reciprocating engine, the arrangement of the various parts of the
reciprocating engine, and the design of the various parts of the
the machine.

During the early part of this machine construction of the pump was
to which suggestions as to the possibility of the machine being constructed
for the work in which the pump was to be used. The result of these suggestions was the design of
the machine of the machine in the design of the pump as finally constructed.
In general, the design of the pump was of the type of pump, which was
reciprocating engine, especially designed for work and was made of the metal
electric power, it was designed to be used with the pump and the machine
the machine, the pump was designed to be used with the pump and the machine
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of the machine was made in a series of large parts of the machine

Appendix B 7.

States and Canada, the principal of which were, the Calumet-Sag Canal of the Greater Chicago Sanitary District, the levee work on the Mississippi River near Hill-house, Mississippi, which work was being done by construction forces of the United States Federal Government; the Livingstone Channel in the Detroit River, the excavation for which was being done by contract for the United States Government; and the Welland Ship Canal, being completed under contract by the Dominion Government.

On these various works were seen, in actual operation, large type shovels, gantries, draglines, locomotives and compressor plants, a number of which were electrically operated. The high speed cableway at the levee work on the Mississippi was under steam operation and there were shovels and dredges on the Welland Canal also operated by steam.

Particular attention is called to the operation of a model 300 Marion steam shovel, doing excavating on section 13 of the Calumet-Sag Canal, which was under contract to A. Guthrie and Sons. This shovel was working in a cut approximately 40 feet deep, of glacial clay, overlying limestone. It was forcibly impressed upon the engineers visiting this work that the conditions here were approximately the same as those which the data indicated for the Niagara work, in that the depth of earth excavation was about equal to the average at Niagara, the material was somewhat similar, and the underlying rock was limestone. This shovel was equipped with an 8-cubic yard dipper, and the superintendent assured us that the engineers had frequently allowed 26 cubic yards bank measurement for three dippers. Apparently, this could be very well credited, as the dipper would come up through the cut heaped up with a solid

Appendix 5 8.

cut from the bank. The shovel was served by only two 6 to 7 car trains of 20-cubic yard capacity each, and the dump was only from 12 to 15 feet deep, apparently resulting in considerable delays to train service. The loading tracks were on both sides of the cut and the cycle of digging was about 45 seconds per dipper. It was apparent that had the train service been adequate, this shovel could dig quite easily 6,000 cubic yards in ten hours. The excavated material was such that it did not need rip-rap and no delays could be chargeable to this item.

In the fall of 1916 prices were submitted by various manufacturers covering shovels, locomotives, cars, compressors, etc., and in the spring of 1917 orders were placed for the following shovel equipment:

- 2 - 225-B Bucyrus electric shovels
- 2 - 103-C " " "
- 2 - 18-B " caterpillar revolving shovels.

The 225-B shovel was equipped with 80 and 90 foot booms and 58 foot dipper sticks, with 5 and 8 cubic yard dippers, the former to be used in rock and the latter in earth. The shovel could load cars standing on a track 70 feet above the track of the shovel, thus giving a lift of 80 feet between the shovel track and the dipper, when opened. It had a total rated motor capacity of 578 horsepower and took power from a 4,000 volt line through its own transformers to an operating voltage of 440. The estimated safe capacity of this shovel in rock was 3,000 cubic yards per ten hour day and 5,000 cubic yards in earth per ten hour day.

The 103-C type of shovel was mounted on standard gauge tracks; equipped

Appendix B 2.

with $3\frac{1}{2}$ and $4\frac{1}{2}$ cubic yard dippers; loading range in height was $10\frac{1}{2}$ feet from track level to track level, and with a car 8 feet high would load at a maximum height of $18\frac{1}{2}$ feet from shovel track to the bottom of the open dipper. The estimated safe capacity of this shovel in earth was 3,500 cubic yards per ten hour day and 2,000 cubic yards of rock per ten hour day.

The 18-B shovels were purchased largely for preliminary railroad construction and miscellaneous small work. One of these shovels was equipped electrically and the other operated by steam.

Orders were also placed for compressors, cars, locomotives, cableway, etc., but for the purpose of this report it will only be necessary to discuss excavation as affected by shovel operation and compressed air service.

On account of the embargoes placed by railroad companies, and the manufacturing of war munitions in the large centres of United States, it was not until May 1918 that the shovels, as ordered in the spring of 1917, were all put in commission.

The above shovel equipment (4) was bought for the purpose of excavating only from station 60 to 452 on the canal, and a forebay for the development of 6,500 second feet. The first 60 stations of canal being in earth, it was deemed advisable to dredge this, and the power house excavation was to be done by derricks. The schedule chart "A", shows one of the numerous possibilities of removing the yardage of excavation; namely, 7,150,000 cubic yards of earth and 2,290,000 cubic yards of rock, the time limit of which was set for December 31st 1920. The chart was prepared on the basis that the shovel would work day shift only for 250 days per year, for ten hours per day, and that the 250 days would

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about 500 and 1,000 cubic yards of rock per hour. The estimated rate of removal of this material is about 1,000 cubic yards per hour. The total amount of material to be removed is about 1,000,000 cubic yards. The estimated cost of this work is about \$1,000,000. The estimated cost of the entire project is about \$2,000,000.

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DATE 11-15-2001 BY 60322 UCBAW/SJS

It is also noted that the above information was obtained from a confidential source who has provided reliable information in the past.

On receipt of the information furnished by the various companies, and the possibility of any change in the large number of other persons, it was not until May 1931 that the records were received in the office of the FBI, and all but the confidential.

The above figures represent the total number of persons who have been employed in the various departments of the Government of India, and are given for the purpose of showing the extent of the employment of the different classes of persons in the various departments of the Government of India.

Appendix E 10.

best be taken in the period between March 1st and December 31st, the months deposits. It may be operated by electric power where conditions are favorable of January and February being considered unsuitable for economical outdoor work.

The capacities of these shovels were fixed from actual records of the manufacturers, and from the actual output as seen on the work of the Calumet-Sag

Canal. The Canadian Equipment Company, from whom the shovels were purchased, is a brand of operation, and costs.

also indicated in their letter of December 9th, 1919 (file 902) that we were

perfectly safe in estimating the capacity of the large 225-B shovels to be resulting from a limit and steady consumption. Therefore, we have

5,000 cubic yards in ten hours. The following is an extract from this letter to the Board of Directors and being considerably the same as the letter to the Board of Directors, which assured us of this yardage.

"This combination with an 8-cubic yard capacity dipper (we figure our dippers water measure, not heaping measure) will give you the maximum capacity, at the same time not sacrifice in reach. We believe that an average of 5,000 cubic yards per day of 10 hours can easily be maintained. In fact, we have records of an average of over 6,000 yards per 9 hour day made with one of our 225-B machines operating in the Pittsburgh-Kansas coal fields in material similar to if not harder digging than that which you will have to handle. This machine also was equipped with a smaller dipper.

"The same boom and dipper handle combination used in their earth section will work out best in the rock section, as can readily be seen by referring to the attached drawing. For the rock work, however, we recommend a 5-yard dipper which will give you an average of 3,500 to 4,000 cubic yards per 10 hour day. It goes without saying, of course, that these capacities are contingent upon the car service."

On page 13 of the Bucyrus bulletin 19-A the following statement appears:

"THE 225-B REVOLVING SHOVEL - The largest of this type - for removing overburden from 15 to 40 feet in depth from horizontal coal veins and from other materials. This shovel has exceptional power and speed of operation, its average capacity being 4,500 to 5,000 cubic yards per nine hours. Its wide reach and high lift make it possible to mine materials economically, impossible to handle by any other method. This also enables it to make one cut, where as standard shovel is obliged to take from 9 to 12 cuts with an equal number of adjustments of the loading track. It is well adapted to stripping coal, from

1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 26

which appeared as of this party.

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 Director of the Federal Bureau of Investigation
 to the Director of the Central Intelligence Agency.
 The letter is dated 10/10/50 and is classified
 as "Confidential". It contains information
 regarding the activities of the Central Intelligence
 Agency and the Federal Bureau of Investigation.
 The letter is signed by the Director of the
 Federal Bureau of Investigation and is addressed
 to the Director of the Central Intelligence Agency.
 The letter is classified as "Confidential" and
 contains information regarding the activities of
 the Central Intelligence Agency and the Federal
 Bureau of Investigation.

THE FOLLOWING INFORMATION IS FOR THE INFORMATION OF THE BOARD OF DIRECTORS OF THE COMPANY AND IS NOT TO BE USED FOR ANY OTHER PURPOSE. IT IS NOT TO BE DISCLOSED TO ANY OTHER PERSON OR ENTITY WITHOUT THE WRITTEN CONSENT OF THE BOARD OF DIRECTORS.

Appendix 5 11.

ore, phosphate rock, zinc, tin, fireclay, talcum, nitrate ore, and similar deposits. It may be operated by electric power where conditions are favorable."

On pages 3 and 6 of bulletin D-3003, appear the following statements under illustrations of one of the shovels operating:

"The speed of operation, and consequent high output, is perhaps the next most important requisite. This has been made possible to the highest degree in this shovel by the following features in design: A boom of a new and improved design which is lighter and stronger than any other yet developed. A shorter revolving frame of light and strong construction. Powerful swinging engines. A single-part hoist which is faster than a three-part hoist. These features enable the 225-B to hoist and swing considerably faster than other shovels of the same size, through requiring less power to start and to stop swinging. This six cubic yard dipper can hold nearly eight cubic yards heaped up. In ordinary digging when the material is overcast, this shovel can average 4,000 to 5,000 cubic yards in nine hours with a six yard dipper. It has even averaged over 6,000 cubic yards in nine hours for a continued run of several days."

"Carney-Cherokee Coal Company's 225-B in a shallow box pit. A 27-D coal loader now replaces the hand labor here shown. This company has two 27-B's. The 225-B has handled 4,500 cubic yards per nine hour day, including all delays and has averaged in a three-day run, 6,038 cubic yards in nine hours."

[illegible]

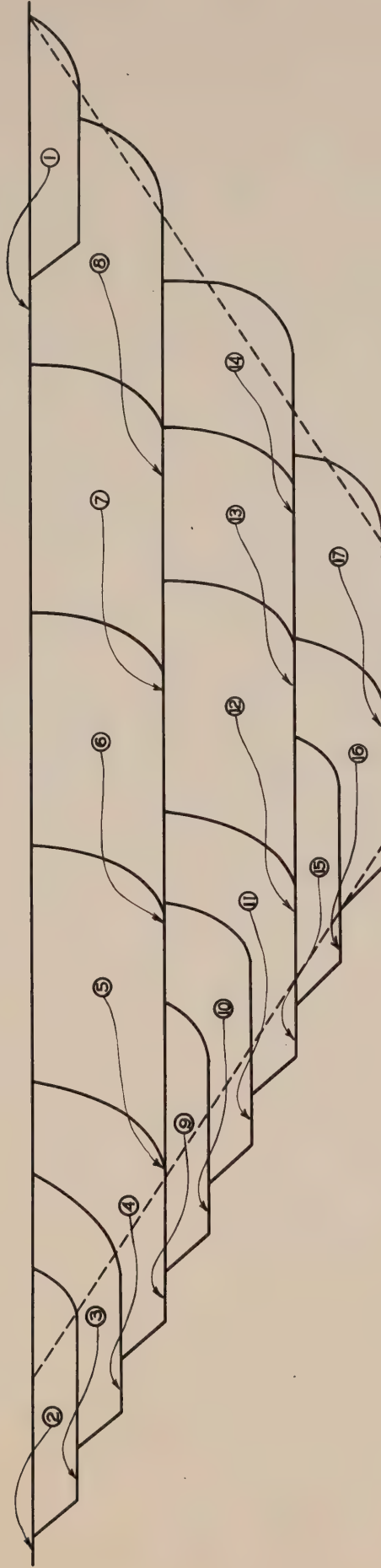
It may be recalled by anyone who has been in the
business of selling goods and services that the

[illegible]

Instructions of one of the several operating

[illegible]

and was awarded a 1000 dollar prize, the Ohio yards is nine months."

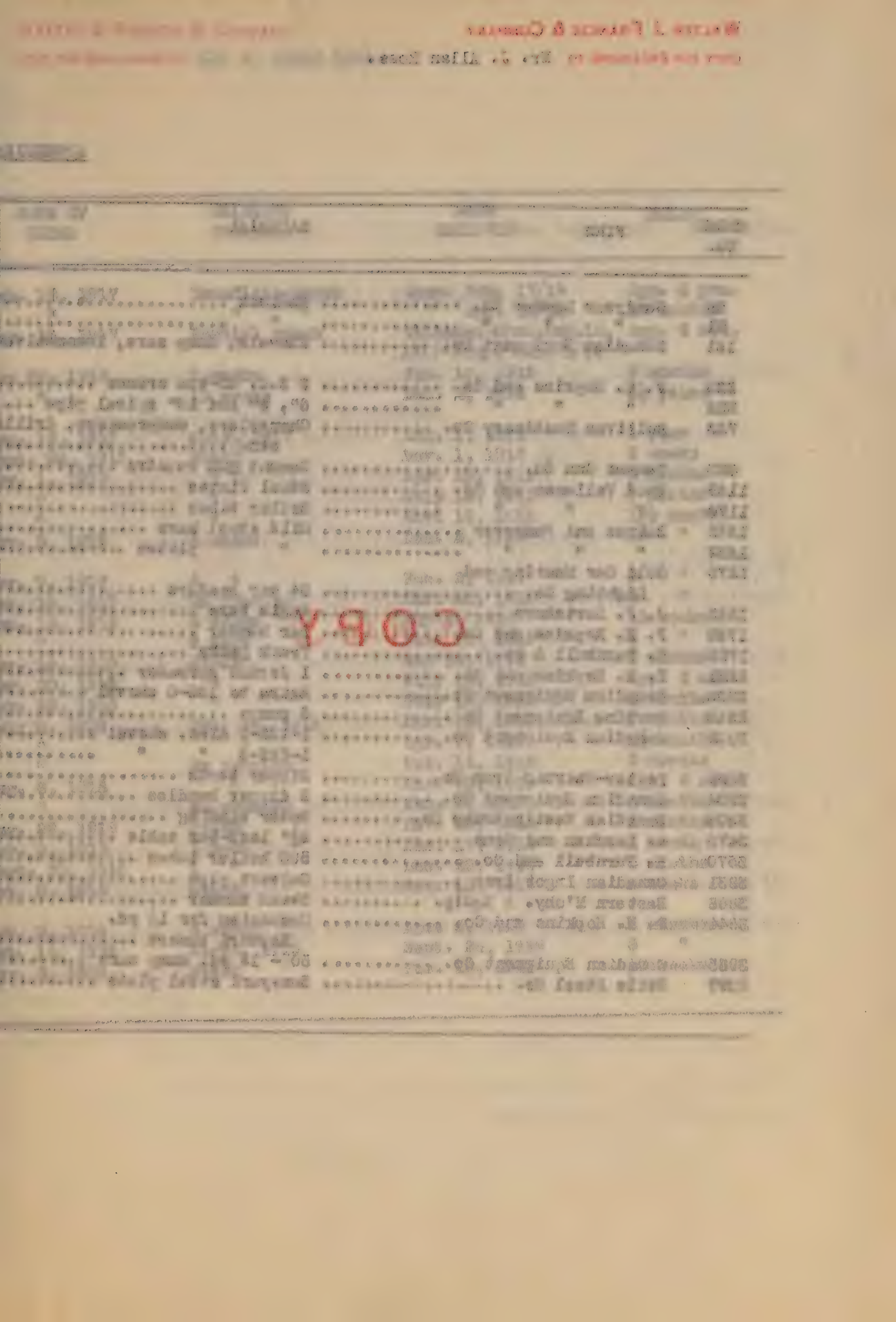


NOTE: MATERIAL TO BE DISPOSED OF TO ONE SIDE ONLY



APPENDIX 6

SEQUENCE OF CUTS
BY A 78 C STEAM SHOVEL
WORKING IN 72' CUT, 62' WIDE
AT BOTTOM, AND SLOPES 1½:1



ORDER NO.	FIRM	MATERIAL
89	Goodyear Lumber Co.	Hemlock
91	" " "	"
161	Canadian Equipment Co.	Shovels, dump cars, locomotives
330	F. H. Hopkins and Co.	3 B.C. 40-ton cranes
332	" " "	6", 8" and 10" spiral pipe
723	Sullivan Machinery Co.	Channelers, compressors, drills etc.
883	Cement Gun Co.	Cement gun repairs
1169	Wood Vallance and Co.	Steel Plates
1170	" " "	Boiler tubes
1235	Baines and Peckover	Mild steel bars
1232	" " "	" " plates
1270	Gold Car Heating and Lighting Co.	54 car heaters
1583	J. J. Gartshore	Angle bars
1768	F. H. Hopkins and Co.	Bar bender
1785	H. Turnbull & Co.	Track jacks
2221	F. H. Hopkins and Co.	1 Jordan spreader
2302	Canadian Equipment Co.	Extra to 103-C shovel
2343	Turbine Equipment Co.	6 pumps
3002	Canadian Equipment Co.	1-103-C elec. shovel
		1-225-B " "
3059	Taylor-Wharton Iron Co.	Dipper teeth
3304	Canadian Equipment Co.	2 dipper handles
3306	Canadian Westinghouse Co.	Rotor winding
3473	A. Leschen and Sons	2 1/2" lock-bar cable
3570	H. Turnbull and Co.	500 boiler tubes
3831	Canadian Ingot Iron	Culvert pipe
3888	Eastern M'chy. & Equip.	Steam hammer
3844	F. H. Hopkins and Co.	Mechanism for 1 1/2 yd. Hayward bucket
3955	Canadian Equipment Co.	50 - 16 yd. dump cars
2097	Ottis Steel Co.	Boneyard steel plate

WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

7.

DATE OF ORDER	SHIPMENT PROMISED	DATE RECEIVED	DELAY
Feb. 12, 1917	Immediate-Stock	Comp. Feb. 17/19	App. 2 yrs.
"	" "	" Apr. 15/18	14 months
Mar. 28, 1917	Partial stock	Shipment comm. Aug. 12, 1917-Comp. Jan. 1/18	App. 6 mos.
May 28, 1917	2 weeks	Feb. 18, 1918	8 months
"	10 weeks	Dec. 2, 1922	5½ years
Jan. 18, 1917	July, 1917	Aug. 1, 1918	1 year
Sept. 24, 1917	Stock	Nov. 1, 1917	5 weeks
Nov. 1, 1917	"	Apr. 25, 1918	6 months
"	"	July 18, 1918	9 months
"	"	Nov. 19, 1918	12½ months
Nov. 5, 1917	4 weeks	Dec. 8, 1918	13 "
Nov. 9, 1917	4 "	Feb. 2, 1918	2 "
Dec. 19, 1917	No promise	Mar. 23, 1918	3 "
Jan. 19, 1918	6 weeks	May 9, 1918	11 weeks
"	5 days	Feb. 19, 1918	3 "
Mar. 16, 1918	Stock	May 18, 1918	2 months
Mar. 20, 1918	"	July 30, 1918	App. 3 mos.
Mar. 25, 1918	"	July 12, 1918	4 months
July 5, 1918	Dec. 28, 1918	Mar. 29, 1919	3 months
"	"	Apr. 9, 1919	3½ months
"	No promise	Oct. 16, 1918	3 months
Aug. 6, 1918	-	Mar. 25, 1919	App. 6 mos.
"	No promise	Jan. 5, 1919	5 months
Aug. 22, 1918	Stock	Nov. 22, 1918	3 months
Nov. 8, 1918	1 week	Dec. 17, 1918	1 month
Sept. 30, 1918	1 "	Dec. 29, 1918	3 months
Oct. 6, 1918	Stock	Nov. 13, 1918	5 weeks
Oct. 8, 1918	3 weeks	Apr. 5, 1919	6 months
Oct. 16, 1918	March, 1919	Sept. 26, 1919	6 "
Nov. 2, 1918	Stock	Feb. 10, 1919	13 weeks

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Cost Department - July 11/23.

APPENDIX 8.

Total Cost of 10 Units \$ 82,000,000.00

Less Permanent Hydraulic, Electrical
& Other Machinery Contracts \$ 13,238,334

Less Contracts for Intake & River,

Etc. 1,000,000

Storage Batteries & Small Motors 17,238,334

Less Cement 3,000,000

17,238,334.00

Net Total of Actual Construction Expenditures \$ 64,761,666.00

Total "Contractors Plant" Investment 9,804,732.81

Ratio of Construction Plant to Construction Expenditures = 15%

In this \$9,804,732.81 of Construction Plant we have a Labor factor for
Assembling of Plant Structures of \$1,900,000 which would not be considered as
actual "Contractors Plant" as purchased, and if this were deducted from the
Plant Account it would leave a balance of \$7,904,732.81, and a ratio to con-
struction of 12.2%.

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APPENDIX 8.Cost Department -
July 11/23.INVENTORY OF "CONTRACTORS PLANT" USEDUSED ON THE NIAGARA DEVELOPMENT

PLANT	ORIGINAL COST	BOOK VALUE	
		MARCH 31, 1922	
Shop Cranes	23,124.98	.....	4,002.00
Storage Batteries & Small Motors	17,072.77	.....	666.00
Sundries	22,058.69	.....	870.00
Shovels	1,087,529.55	.....	277,728.00
Channelers	147,746.71	.....	37,807.00
Drills (Tripods, Submarine, Etc.)	284,351.08	.....	65,250.00
Compressors including Motors Etc.	352,607.07	.....	108,750.00
Cableway	66,175.83	.....	34,800.00
Electric Locomotives	930,049.42	.....	326,587.00
Steam Locomotives	337,902.71	.....	158,089.00
Dump Cars, Incl. Flat, Box & Ballast Cars ...	1,432,475.33	.....	403,300.00
Dump Wagons	9,502.85	.....	1,305.00
Hauling Trucks	21,454.13	.....	2,510.00
Tractors	12,515.17	.....	1,044.00
Hoists & Derricks Incl. Motors	364,920.79	.....	87,000.00
Locomotive Cranes	199,044.01	.....	102,374.00
Crushers)	235,079.74	.....	61,187.00
Conveyors)			
Concrete Plants Including Motors, Etc.	2,703,214.06	.....	113,320.69
Machine Tools (Machine shop equipment)	100,191.32	.....	30,450.00
Woodworking Machinery	13,868.94	.....	3,480.00
Misc. Plant (Gen. Equipt.)	519,921.03	.....	69,600.00
Transformers	68,892.31	.....	19,575.00
Pumps (Incl. motors, etc.)	185,988.64	.....	43,500.00
Tanks	39,418.94	.....	1,740.00
Autos & Trucks	153,617.12	.....	71,695.00
Horses & Stable Equipt. Etc.	22,403.88	.....	2,610.00
Rented Plant	453,597.74	.....	-
TOTAL PLANT	\$9,804,732.81	.....	\$2,099,459.69

APPENDIX 9.

COMPARATIVE COSTS OF STEAM AND ELECTRIC SHOVELS.

Quotations were obtained from the Bucyrus Company in 1916 on both steam and electrically operated shovels of the type 103-C. The electric shovel at \$40,910.00, and the steam shovel at \$24,305.00, or a ratio of 1 to 1.68.

Under order dated March 23th, 1917, purchase was actually made of one 18-B steam and one 18-B electric shovels from the Bucyrus Company. The electric shovel was purchased at \$15,732.00 and the steam shovel at \$10,805.00.

In 1918 electric shovel No. 8 (225-B) was purchased at \$152,000.00. In 1920 No. 11 steam (Marion 300) was purchased at \$145,649.00 and No. 12 (Bucyrus 225-B, steam) was purchased at \$138,072.00.

By referring to the chart of price variation between 1918 and 1920, it shows a relation of 250 for 1918 and 300 for 1920. Applying this factor, No. 11 becomes \$121,000.00 at 1918 prices and No. 12 becomes \$115,000.00 at 1918 prices.

APPENDIX 5

FLUCTUATION IN PRICES

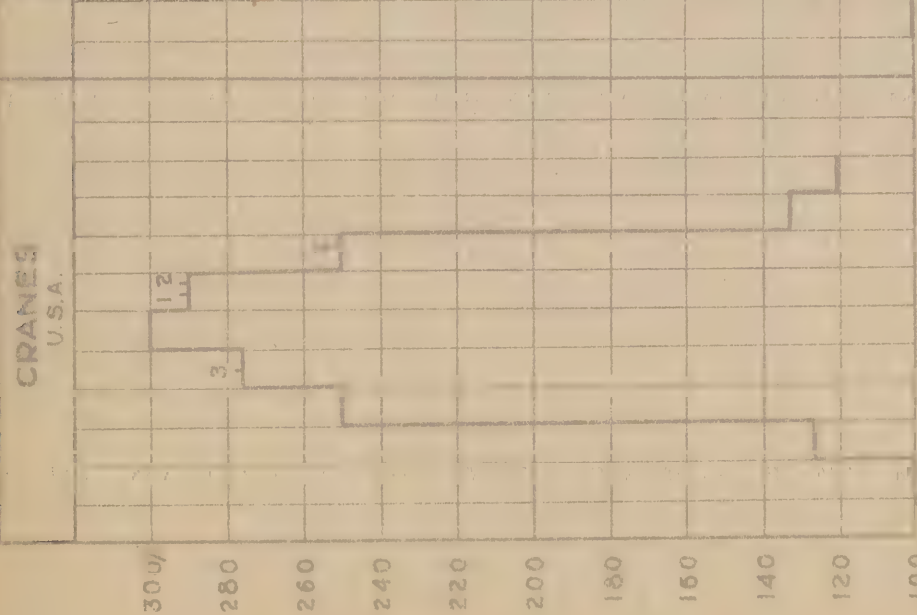
1914-1922

STEAM SHOVELS			ELECTRIC SHOVELS			RATIO
DATE OF ORDER	NUMBER	COST	DATE OF ORDER	NUMBER	COST	
Mar. 28, 1917	No. 5-18-B	\$ 10,805.00	Mar. 28, 1917	No. 1-225-B	\$88,000.00	
				No. 2-225-B	88,000.00	
				No. 3-103-C	43,865.00	
				No. 4-103-C	43,865.00	
				No. 6-18-B	15,732.00	1:1.46
			July 6, 1918	No. 8-225-B	152,000.00	
				No. 9-103-C	73,875.00	
Jul. 12, 1920	No. 11-300 M	145,649.00				
Aug. 14, 1920	No. 12-225-B	138,072.00				
For 1918						
price	No. 11-300 M	121,000.00	July 6, 1918	No. 8-225-B	152,000.00	1:1.26
"	No. 12-225-B	115,000.00	"	"	152,000.00	1:1.32

Quoted, 1916	103-C	24,315.00	Quoted, 1916	103-C	40,910.00	1:1.68
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COPY

The average ratio = 1:1.45, or the electric shovels cost about 45% more than the steam.



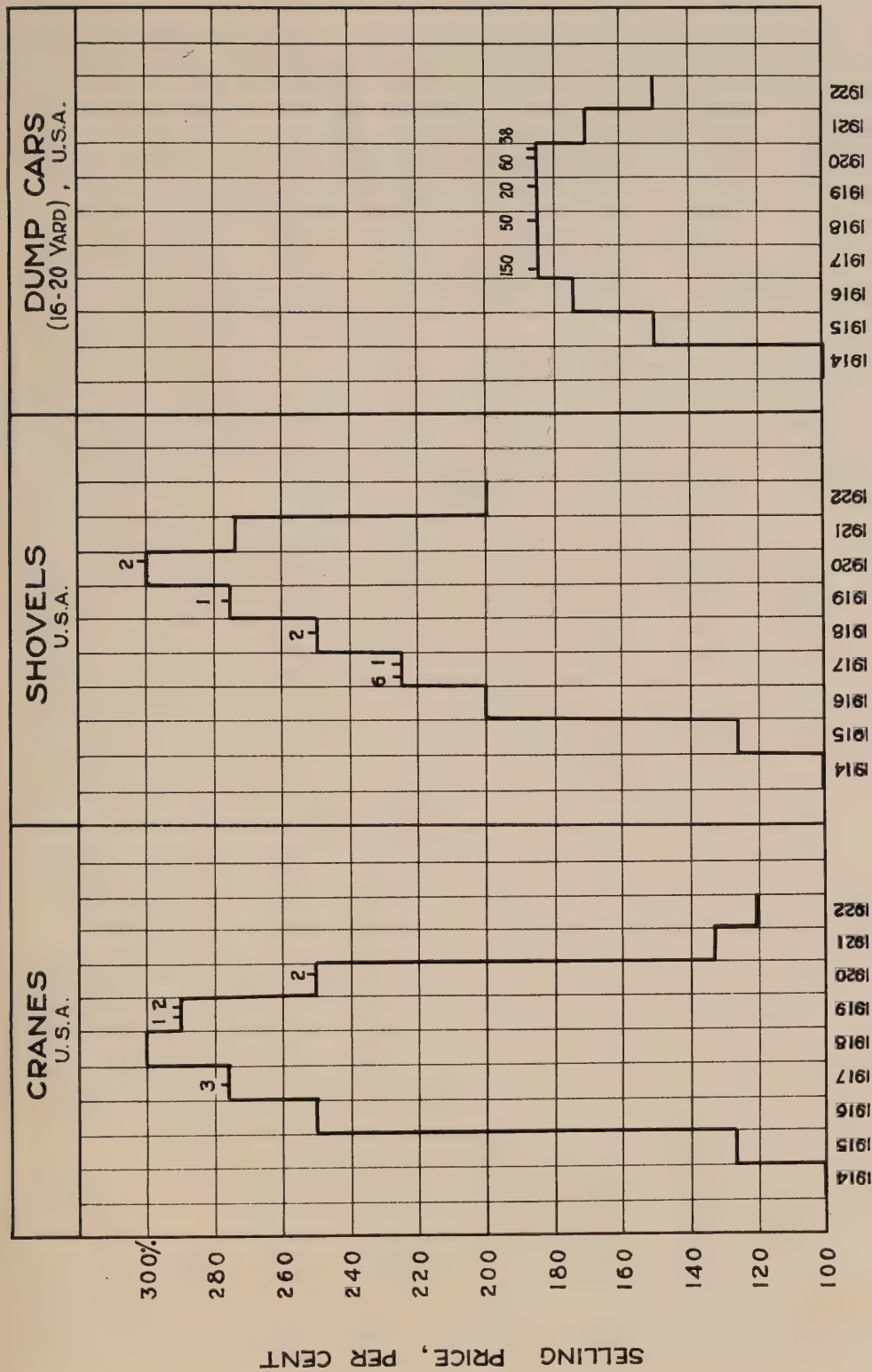
FIGURES REPRESENT NUMBER OF SHOVELS APPROXIMATELY PURCHASED

CRANES U.S.A.

FIGURES REPRESENT NUMBER OF CRANES APPROXIMATELY PURCHASED

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then the steam.



APPENDIX 9

VARIATION IN PRICES

1914-1922

FIGURES REPRESENT NUMBER PURCHASED
DOTS REPRESENT APPROXIMATE PURCHASE DATE

APPENDIX 10. Sec. 1.

EXTRACTS FROM COST REPORTS MADE TO H.G. ACRES BY
A. G. BRADLEY, COST ACCOUNTANT, DURING THE COURSE OF THE
WORK, AND REFERRING TO THE PROVEN SUPERIORITY OF THE
LARGE ELECTRIC SHOVEL, IN THE MATTER OF PRODUCTION AND
UNIT COST, OVER THE RAILWAY TYPE OF SHOVEL.

COMMENTS FROM REPORT OF APRIL, 1920

(Re: Large Electric vs. Small Railway Type Shovel)

Earth and rock costs in the intervening time between 1917 and 1920 have had
strike advances, not only applying to common labor but also to all the trades,
and apart from that, several particular classes, working over eight to twelve
hours, demanded double time for the extra two or four hours, as the case may have
been. These rising conditions in the labor market show 67% advance over 1917,
but instead of the labor cost of a cubic yard of earth and rock rising in unison
with the man's pay, we have, at this date, a proven fact which shows conclusively
that the predecision of those who shaped the Hydro policy of plant require-
ments in the earth and rock excavation has been amply vindicated by the success
of the large 8-cubic yard type of electric shovels.

This is all the more commendable in the face of the then radical change in
size, and the fact that electricity was to be the motive power, which in both
cases was a radical departure over the type of shovel then in general use by
contractors. Those who witnessed the different behaviour in quicksand of the
two classes of shovels, soon realized that if the small railway type shovels had

11. 12. 1911.

EXTRACTS FROM GOVT REPORT MADE TO H.O. JONES BY
A. G. BRADLEY, GOVT ACCOUNTANT, DURING THE COURSE OF THE
HIS, AND THE GOVT TO THE H.O. JONES, IN THE MATTER OF PERMANENT AND
LARGE AT THE END OF THE MATTER OF PERMANENT AND
WITH GOVT, OVER THE RAILWAY TYPE OF REPORT.

11. 12. 1911.

11. 12. 1911.

COPY

THESE ARE THE GOVT OF THE MATTER OF PERMANENT AND
LARGE AT THE END OF THE MATTER OF PERMANENT AND
WITH GOVT, OVER THE RAILWAY TYPE OF REPORT.

Appendix 10 2.

Due to the fact of 1812 and 1814 earth excavation in a great extent, the excavators have been forced to take out the deep excavation in successive lifts, working in it is understood that only but the dry quicksand all the time, with the serving train beside them, the saving in cost per cubic yard as seen on yearly chart attached, as well as the saving in total dollars, would never have been realized, as it actually was by the decision to use the balanced quota of large and small shovels as purchased, rather than all of the small railway type.

This balanced quota worked out admirably well, the small railway type removing the top dry cutting, and the large electric removing the narrow deep 70 foot cuts of water saturated sand, while standing on rock bottom, and loading trains 70 ft. above on well ballasted dry loading tracks.

In order to clearly describe our pumping or unwatering difficulties it would first be well to understand the sand formations of the locality through which the canal passes.

Practically the entire township of Stamford is sand of a very fine nature, and especially so in the vicinity of our canal excavation. About five miles of the canal centre section is located in a basin of depressed rock where, previous to the opening up of cuts along the route, water seemed to maintain a certain level within a few feet of the ground surface, and as soon as a cut was started in this area by our shovels, this water made an absolute quicksand mire out of the material being excavated. In this large area the small shovels proved absolutely useless, with the exception of the southern extremity from Lundy's Lane, where the top dry cutting was removed by them. Our only salvation in this area lay in the large shovels, and their ability to dig down to rock foundation.

The difficulties to overcome in this area were tremendous, and affected

[illegible]

of the small railway type.

[illegible]

Appendix 10 3.

the costs of 1919 and 1920 earth excavation to a great extent, especially when it is understood that this battle against water, slides, and quicksand extended over approximately one-half of our canal earth, not in any minor way, but in a very appreciable way, as related to cost fluctuations, especially to those of the large electric shovel.

EXTRACT FROM REPORT MADE IN 1919

(Re: Large Electric vs. Small Type Shovels)

COPY

The carrying out of this undertaking is demanding a trial of some of the newest, best equipped, and nicest working excavating plant in the world at this time. This plant as well, has proven its superior efficiency by reason of its well balanced nature for this particular work, over what we would have experienced had we adopted the methods of the present known large excavation contractors. I know of no large contractor with whom I have had business relations who could, or would, have undertaken this work and successfully carried it out under the plan they would have adopted; namely, the use of the small railway type steam shovels with which they are at present equipped, and which they would probably insist on using, owing to the higher investment cost, and to a natural aversion to the electric shovel on account of a prevailing general belief that the electric is slow. The common practice among contractors is to excavate the top cut in earth where they could make easy money, and which they would be forced to do here, but the second depth cutting would find this type of shovel

..... 65 21

[illegible]

(The large black box contains the following text, which is upside down and mirrored in the original image):

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CHICAGO, ILL. 60637
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FAX: 773-936-5001
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[illegible]

Appendix 10 4.

hopelessly wallowing in quicksand and the Commission would, ere this, have been faced with an admission of inability, on the part of the contractor, to carry on to completion even the earth work, and undoubtedly the Commission would have been called upon to finance the balance of the work, and be burdened by having to take over a junk contractor's plant as partial security.

Knowing the proven results, and success of the large electric shovels and their electric hauling equipment, and knowing the radical change this equipment has meant over the old types of contractor's plant, one can feel a keen admiration for those who made the decision to use this new plant. Praise is also due to the mechanical ability that experimented with and rebuilt the original large shovels after their introduction on this development, as the first two were more or less remodelled, by the Construction Department, to meet the special conditions on this work.

COMMENTS ON YARDAGE OUTPUT UP TO JULY, 1919
WITH ATTACHED TABLES NOS. 2 and 2-A.

A reference to, and comparison of the two tables attached, will show our excavation of earth has far outclassed the Welland Ship Canal in the higher average of shovel efficiency figures. We are taking out more yardage per one cubic yard bucket capacity employed per ten hours, notwithstanding our quicksand troubles, which in the main, I think will overbalance their heavier class of material, which was a greasy clay.

A study of table No.2 will show that the large Bucyrus-8 cubic yard type is giving the highest results in yardage excavated in the six months of 1919,

to have been a little more than a place of partial security.

shovels after their introduction to the Government, and the first two were

more or less demolished, by the Construction Department, to meet the special

Give name of all those having an interest
in the land, and state of residence.

of material which was removed from
and destroyed, which by the way, I again will emphasize their master plan
and this year we have actually captured part of their, international and anti-
average at many different places, we are taking our own picture and we
organization or world has not mentioned the United States in its report
a reference to, the suggestion of the two leaders discussed, will show our

A copy of this bill will also be sent to the House of Representatives.

Appendix 10 5.

where it will be seen that the greatest yardage, with the best average per one cubic yard per ten hours, was accomplished; the figures showing 1,146,338 yards excavated and 279 for the efficiency comparison. Furthermore, as against an average efficiency figure of 200 per one cubic yard bucket per ten hours for shovels on the Welland Canal, the average of our smaller type railway shovels show an efficiency figure of 286.

The accompanying chart further amplifies the comparison of the large electric shovels, as against the smaller railway type, in the matter of cost per cubic yard of production.

This chart shows that the railway type shovel was employed to the maximum that was possible for this shovel to work in dry material; namely, a total of 39% of the whole earth excavation, but at a cost much higher than the large electric, even considering the fact that the railway type shovel worked always in top dry cutting, with the short lift to trains, while the large electric were always in the quicksand with up to a 70 foot lift to trains.

• 1999 • *Field and Laboratory*

[illegible]

The following are the names of the persons who are in the possession of the large electric shovels, as well as smaller railway type, in the matter of some per cable yard of the same.

There is no doubt that the railway was operated in the manner
that was possible for this branch of the railway; namely, a total of
one of the main trunk lines, but as a good many lines have been
abandoned, even including the fact that the railway was never opened
to the public, with the same list as before, while the lines
were always in the same way as in a few days in the past.

THE BOARD OF DIRECTORS OF THE
AMERICAN TRADING COMPANY
HAS APPROVED THE FOLLOWING
RESOLUTIONS:

Item	Quantity	Unit Price	Total
1. 1000 lbs. of No. 1 Coffee	1000	\$1.00	\$1000.00
2. 500 lbs. of No. 2 Coffee	500	.80	\$400.00
3. 250 lbs. of No. 3 Coffee	250	.60	\$150.00
4. 100 lbs. of No. 4 Coffee	100	.40	\$40.00
5. 50 lbs. of No. 5 Coffee	50	.20	\$10.00
6. 25 lbs. of No. 6 Coffee	25	.10	\$2.50
7. 10 lbs. of No. 7 Coffee	10	.05	\$0.50
8. 5 lbs. of No. 8 Coffee	5	.02	\$0.10
9. 2 lbs. of No. 9 Coffee	2	.01	\$0.02
10. 1 lb. of No. 10 Coffee	1	.00	\$0.00
11. 1000 lbs. of No. 1 Tea	1000	\$1.00	\$1000.00
12. 500 lbs. of No. 2 Tea	500	.80	\$400.00
13. 250 lbs. of No. 3 Tea	250	.60	\$150.00
14. 100 lbs. of No. 4 Tea	100	.40	\$40.00
15. 50 lbs. of No. 5 Tea	50	.20	\$10.00
16. 25 lbs. of No. 6 Tea	25	.10	\$2.50
17. 10 lbs. of No. 7 Tea	10	.05	\$0.50
18. 5 lbs. of No. 8 Tea	5	.02	\$0.10
19. 2 lbs. of No. 9 Tea	2	.01	\$0.02
20. 1 lb. of No. 10 Tea	1	.00	\$0.00

COPY

THE BOARD OF DIRECTORS OF THE
AMERICAN TRADING COMPANY
HAS APPROVED THE FOLLOWING
RESOLUTIONS:

Appendix

Table No. 2.

RECORD OF COMPARISONS IN SHOVEL EFFICIENCY.- THE
YARDAGE FROM THE START OF WORK ON HYDRO CANAL.-
1 CY. CAPACITY SO THAT A COMPARISON OF THEIR ACTU

Shovels	Type & Capacity	No. 10 Hr. Shifts Employed on 1 CY. Basis 1917	Yardage 1917.	Unit of Eff. Comp. 1917	No. 10 Hr. Shifts Employed on 1 CY. Basis 1918
Shov. #1	225B-3 Cy.	-	-	-	2400
" #2	" "	-	-	-	1600
" #3	" "	-	-	-	-
Total of this type for periods					4000
Shov. #3	1050-3 1/2 Cy.	45	9236	205*	1312
" #4	" "	-	-	-	567
" #9	" "	-	-	-	-
Total of this type for periods					1879
Shov. #5	183-3/4 Cy.	131	52590	401*	225
" #6	" "	13	5750	427*	225
Total of this type for periods					450
Shov. #7	Steam 2 1/2 Cy.	500	140605	281*	625
" #10	" 1 "	-	-	-	-
Total of Steam for periods					625
Dredge	5 Cy.	-	-	-	436
Cableway	3 "	-	-	-	450
TOTAL		689	200181	302*	7839

(* denotes figures shown in red in Mr. Acres's report. W.J.F.)

Section 1

Cost Department, July 1919.

REPORT IS A COMPILATION OF THE RECORDS IN EARTH
 L SHOVELS ARE BROUGHT TO A COMMON DENOMINATOR OF
 EFFICIENCY MAY BE SEEN INDIVIDUALLY AND BY TYPE

Yardage 1918.	Unit of Eff. Comp. 1918	No. 10 Hr. Shifts Employed on 1 CY. Basis 1919	Yardage 6 Mos. 1919	Unit of Eff. Comp. 1919	TOTAL AVERAGE EFF.
595	211*	1416	449168	517*	251*
7167	211*	2400	635291	265*	243*
	-	296	61879	209*	209*
7663	211*	4112	1146338	279*	246*
016	219*	250	44232	171*	211*
663	192*	304	9911	114*	136*
	-	371	194722	525*	525*
679	211*	934	246865	266*	229*
956	239*	117	28484	243*	285*
079	191*	122	32149	264*	225*
035	215*	239	60633	253*	259*
174	54*	32	16497	515*	165*
	-	20	1477	73*	73*
174	54*	52	17974	345*	164*
050	237*	375	109511	292*	262*
870	142*	900	177560	197*	176*
570	197*	6612	1760881	267*	232*

To arrive at machines daily average for above periods multiply the
 Unit of Efficiency by the corresponding dipper capacity.

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UNIT	NO. 10	NO. 11	NO. 12	NO. 13	NO. 14	NO. 15	NO. 16	NO. 17	NO. 18	NO. 19	NO. 20	NO. 21	NO. 22	NO. 23	NO. 24	NO. 25	NO. 26	NO. 27	NO. 28	NO. 29	NO. 30	NO. 31	NO. 32	NO. 33	NO. 34	NO. 35	NO. 36	NO. 37	NO. 38	NO. 39	NO. 40	NO. 41	NO. 42	NO. 43	NO. 44	NO. 45	NO. 46	NO. 47	NO. 48	NO. 49	NO. 50	NO. 51	NO. 52	NO. 53	NO. 54	NO. 55	NO. 56	NO. 57	NO. 58	NO. 59	NO. 60	NO. 61	NO. 62	NO. 63	NO. 64	NO. 65	NO. 66	NO. 67	NO. 68	NO. 69	NO. 70	NO. 71	NO. 72	NO. 73	NO. 74	NO. 75	NO. 76	NO. 77	NO. 78	NO. 79	NO. 80	NO. 81	NO. 82	NO. 83	NO. 84	NO. 85	NO. 86	NO. 87	NO. 88	NO. 89	NO. 90	NO. 91	NO. 92	NO. 93	NO. 94	NO. 95	NO. 96	NO. 97	NO. 98	NO. 99	NO. 100									
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UNIT OF THE
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COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

PERCENTAGE OF TOTAL YARDAGE OF EARTH

90 80 70 60 50 40 30 20 10 0

Table No. 2-A.

Cost Department,
July 1919.

WELLAND SHIP CANAL

COMPARISONS OF SHOVEL EFFICIENCY.

SHOVEL
EFFICIENCY

B.Y. & H.	- 3½ c.y.	steam shovel, Bucyrus	217	1,889 c.y. per 10 hrs.				
"	- 3½ c.y.	" dragline "	125	1,072	"	"	"	"
S. & R.	- 2½ c.y.	" Atlantic shovel	240	1,720	"	"	"	"
Y. & R.	- 2½ c.y.	" dragline, Bucyrus ..	167	1,207	"	"	"	"
H. & L.	- 2½ c.y.	" shovel " ..	184	1,323	"	"	"	"
D.D.Co.	- 3½ c.y.	" dragline " ..	125	1,086	"	"	"	"
"	- 2½ c.y.	" Marion Osgood shovel	160	1,157	"	"	"	"

Average efficiency of shovels 200

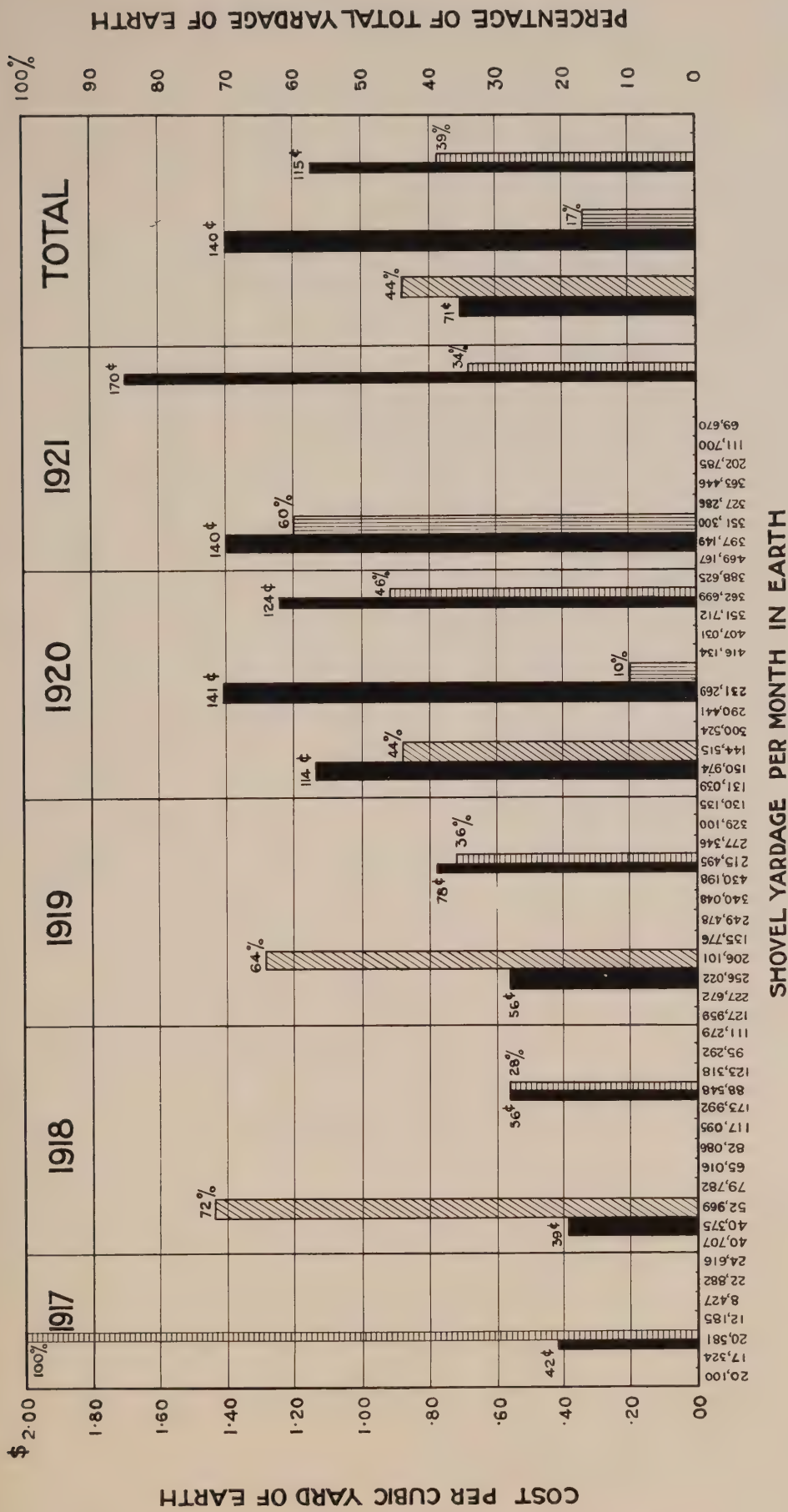
" " " dragline 138

The above records for shovels and draglines cover 4,500,000 cubic yards of earth excavation.

APPENDIX 10

CANAL SHOVEL DATA

WITH LARGE ELECTRIC LARGEST AND SMALL TYPE SHOVEL COMPARISONS



APPENDIX 10 CANAL SHOVEL DATA WITH LARGE ELECTRIC, LARGE STEAM AND SMALL TYPE SHOVEL COMPARISONS

- KEY**
- SMALL TYPE SHOVELS
 - LARGE ELECTRICS
 - LARGE STEAMS



APPENDIX 10. Sec. 2.

ATLANTIC STEAM SHOVEL NO. 7 VS ELECTRIC SHOVEL NO. 3.

The Atlantic steam shovel No. 7 was purchased second-hand at the beginning of the work and was equipped with a $2\frac{1}{2}$ cubic yard dipper.

Electric shovel No. 3 was purchased new at the beginning of the work and was equipped with $3\frac{1}{2}$ and $4\frac{1}{2}$ cubic yard dippers.

These shovels will be compared in earth excavation only; No. 3 from October 1919 to March 1921, inclusive, omitting March 1920 (in rock) and June and July 1920 (strike); and No. 7 from **COPY** July 1919 to March 1921, inclusive, omitting June and July 1920 (strike). These periods are taken when both shovels were in as similar conditions of both time of year and material of excavation, as could be obtained.

The conditions in rock excavation were not equal or similar at any one period when both shovels were working.

No. 3 encountered some wet digging during its period and also some excavation which, while classified as earth, was mixed with some rock, as in February, 1920. It was also dismantled and re-erected in February 1920, for moving from Division No. 3 to No. 2.

On account of No. 7 shovel being purchased second-hand at pre-war price, the depreciation and interest charges were relatively small compared with those against electric shovel No. 3, purchased new under war conditions.

The total interest and depreciation charge against No. 3 for the full

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The following items were received from Mr. J. Allan Ross, of the
of the work and was assigned with a 1000 series and 1000
classified under No. 1 and 1000 series of the work and
was equipped with 1000 and 1000 series and 1000 series.
These items will be assigned to the 1000 series and 1000 series
1000 series and 1000 series, including 1000 series and 1000 series
1000 series and 1000 series, including 1000 series and 1000 series
and 1000 series. These items are now in the 1000 series and 1000 series
similar conditions of both items and subject of investigation, as well
be obtained.

The following is a list of items received from Mr. J. Allan Ross, of the
which were received.
No. 1 was received from Mr. J. Allan Ross, of the 1000 series and 1000 series
the 1000 series, which included the 1000 series, and 1000 series, and 1000 series
1000 series. It was also received and received in 1000 series, 1000 series, 1000 series
Division No. 1 to No. 2.

On account of Mr. J. Allan Ross, of the 1000 series and 1000 series
the Department and interest in the 1000 series and 1000 series, and 1000 series
against electric items No. 1, 1000 series and 1000 series, and 1000 series.
The total interest and Department items received No. 1 to No. 2.

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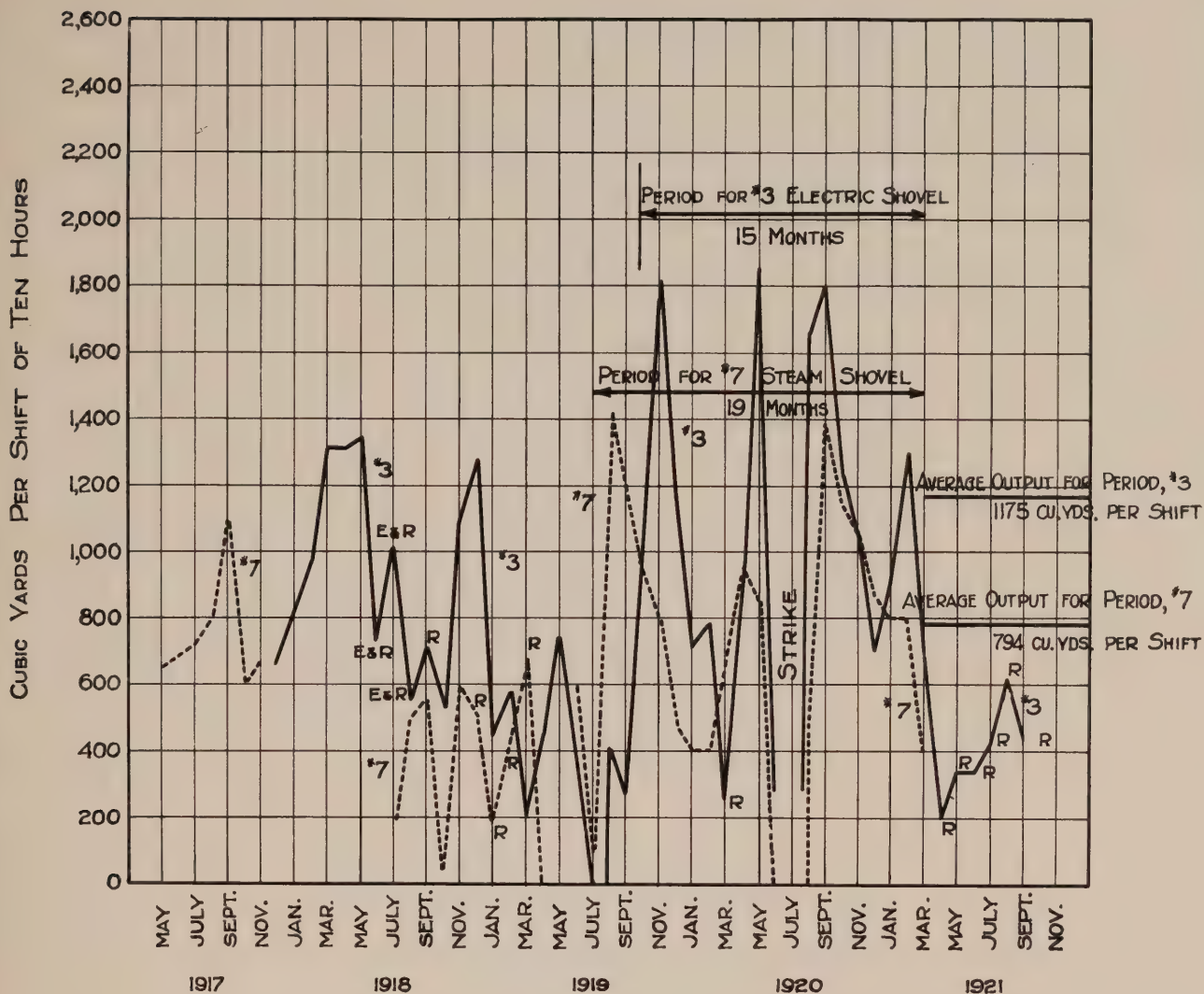
period was \$31,279.00 which included the depreciation chargeable to rock in March 1920. Deducting this, there remains a charge of 3.4 cents per cubic yard against earth for the 15 months that this shovel was in earth excavation.

The total interest and depreciation charged against No. 7 for 22 months, beginning June 1919, was \$ 12,154.50 which is a charge of 1.7 cents per cubic yard for earth excavation, or a difference of 1.7 cents per cubic yard.

The output of No. 3 for the 15 months was 831,116 cubic yards, or 1175 cubic yards per shift of ten hours, at a cost of \$1.016 per cubic yard, and for No. 7 for 19 months was 714,540 cubic yards or 794 cubic yards per shift at a cost of \$1.14 per cubic yard.

Placing these values on the same basis of depreciation and interest, the cost of No. 3 becomes 99.9 cents and No. 7 - \$1.14. Thus, No. 3 takes out 150% of the yardage of No. 7 and at 86% of the cost of No. 7; or, looking at the situation in another way, No. 3 takes out 171% of the yardage of No. 7 on the basis of equivalent cost; and this while handicapped by some wet digging, some mixed earth and rock excavation, and the cost of dismantling and re-erecting in February 1920.

APPENDIX 10
CHART SHOWING RELATIVE OUTPUTS
PER SHIFT OF TEN HOURS
OF NO. 3 AND NO. 7 SHOVELS



APPENDIX IO

CHART SHOWING RELATIVE OUTPUTS
PER SHIFT OF TEN HOURS
OF NOS 3 AND 7 SHOVELS



APPENDIX 10. Sec. 3.

STEAM VS. ELECTRIC SHOVEL IN EARTH EXCAVATION
COMPARING NO. 8, 225-B ELECTRIC AND
NO. 12 - 225-B STEAM

Shovel No. 8 worked in earth excavation of canal during the months June to December 1920, inclusive, and in January 1921, and No. 12 during December 1920 and January to April 1921, inclusive. These are the only two periods during which both shovels were working in earth that have conditions as nearly as possible comparable. The months of June and July, 1920 are omitted on account of the strike which created an abnormal condition.

The following statement shows the output, number of shifts, cost per cubic yard, height lifted, etc., for both shovels for the months specified:

SHOVEL NO. 8 - EXCAVATION VERY WET

MONTH AND YEAR	CUBIC YARDS	NO. OF SHIFTS	C.Y. PER SHIFT	TOTAL COST	UNIT COST	HEIGHT LIFTED	MAN HR. RATE
Aug. 1920	124,468	52	2,390	119,484.81	.960	47'	61¢
Sept. "	161,601	50	3,230	134,126.84	.830	50'	62.5¢
Oct. "	121,730	48	2,535	126,220.36	1.046	37'	63.2¢
Nov. "	78,272	50	1,565	91,459.86	1.170	39'	63.8¢
Dec. "	90,596	51	1,775	112,170.93	1.240	42'	63.2¢
Jan. 1921	122,966	44	2,795	160,500.16	1.316	48'	62.2¢
Total or Average	699,633	295	2,380	743,962.65	1.063	44.5'	62.6¢

ALLEGEDLY

STANDARD V. ALLEGEDLY IN THE
CONCERNING NO. 8, 200-2-100000 AND
NO. 12 - 200-2-100000

There is a record in early connection to some being the same
to December 1963, inclusive, and in January 1964, and in January 1965
1963 and January to April 1964, inclusive. There are also two records
during which time there were records in early 1964 and early 1965
on possible connection. The records of late 1964 and early 1965 are related to
records of the same date related to several matters.

COPY

The following records are in the files, under the name, most of which
were, names listed, etc., for both records for the months specified:

STANDARD V. ALLEGEDLY

DATE	NAME	NO. OF	DATE	NAME	NO. OF	DATE	NAME	NO. OF
1963, 1960	124,400	32	1963, 1960	124,400	32	1963, 1960	124,400	32
"	181,601	30	"	181,601	30	"	181,601	30
"	181,730	48	"	181,730	48	"	181,730	48
"	78,272	30	"	78,272	30	"	78,272	30
"	90,000	31	"	90,000	31	"	90,000	31
1963, 1960	122,400	44	1963, 1960	122,400	44	1963, 1960	122,400	44
Total	124,400	32	Total	124,400	32	Total	124,400	32

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SHOVEL NO. 12 - EXCAVATION MORE NEARLY NORMAL

MONTH AND YEAR	CUBIC YARDS	NO. OF SHIFTS	C.Y. PER SHIFT	TOTAL COST	UNIT COST	HEIGHT LIFTED	MAN HR. RATE
Dec. 1920	79,150	50	1,583	199,824.97	1.460	39'	63.2¢
Jan. 1921	85,869	50	1,717	130,544.51	1.520	47'	62.2¢
Feb. "	108,695	44	2,470	141,638.21	1.300	34'	62.0¢
Mar. "	121,931	55	2,175	171,134.73	1.400	43'	62.5¢
Apr. "	137,884	54	2,550	186,705.73	1.360	40'	61.6¢
Total or Average	529,499	253	2,093	739,943.15	1.397	40.8'	62.3¢

The conditions for No. 8 shovel around station 200 to 235 were unusually wet, requiring extra batteries of pumps. This shovel was forced back several times by sliding banks, and seriously delayed in consequence.

No. 12 did not encounter nearly so bad ground, as it was near the peak of rock, giving better drainage and drier digging.

The tabulation shows that No. 8 took out 113.5% of the output per ten hour shift of No. 12 and at 76.1% of the cost per cubic yard, or 150% more output than No. 12 on the basis of equivalent cost.

The height lifted by No. 8 was 44.5 ft. against 40.8 ft. for No. 12, or 3.7 ft. of lift in favor of No. 12.

From a comparative test of electric and steam shovels in rock out, it was found that a difference of 18 ft. in lift effected an increase of 24% in actual digging time, or of output, so that a drop of 3.7 ft. of lift should show approximately 5% increase in the output. Therefore, for the same lift No. 8 would take out 5% more than when in deep out; i.e., the equivalent output of

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times by sliding plates, and seriously delayed in response.

rock, giving better definition and color design.

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DATE 08-20-2008 BY 60322 UCBAW

There is a significant body of research on the effects of the environment on human health. This research has shown that the environment can have a profound impact on the physical and mental health of individuals. For example, exposure to air pollution has been linked to a variety of respiratory and cardiovascular diseases. Similarly, exposure to toxic substances in the environment can lead to a range of health problems, including cancer and reproductive issues. The environment also plays a role in the development of mental health disorders, with factors such as noise and crowding being associated with increased levels of stress and anxiety. Understanding the complex relationship between the environment and human health is crucial for developing effective public health interventions and policies to protect and improve the well-being of the population.

1. The first part of the report is a general introduction to the subject of the study. It discusses the importance of the study and the objectives of the research.

Appendix 10 3.

No. 8 at the same cost and same lift would be $\frac{125}{100} \times 150\% = 157.5\%$ of the output of No. 12 for the same cost, notwithstanding the unusually treacherous bank and wet digging it encountered.

To illustrate the serious handicaps that No. 8 shovel had, the following are extracts from the daily shovel reports and will indicate to some extent the difficulties encountered:

August 5th, 1920	.....	Digging out track.
" 9th, "	.....	" " "
" 16th, "	.....	" " shovel - off track.
" 24th, "	(day)	" shovel out of mud.
" 24th, "	(night)	" in 4 ft. of water.
" 25th, "	.....	Water high, building dam.
September 1st, 1920	.....	Building dam behind shovel.
" 13th, "	.....	Digging shovel out of mud.
" 25th, "	.....	Moving back to rip-rap pit.
October 5th, "	.....	Jacking shovel to get tracks under.
" 7th, "	.....	" " " " " "
" 18th, "	.....	Digging out pontoons.
" 29th, "	.....	Loading track caved in.
November 3rd, "	.....	Digging shovel out of mud.
" 4th, "	.....	Clearing tracks to move up.
" 17th, "	.....	Loading track caved in.
December 6th, "	.....	Pulling pontoons.

Note that references to severe conditions of wet digging are not in evidence as No. 8 approaches the position where No. 12 started in. No further reference to unusual conditions appears after December 6th.

Regarding No. 12 there are only two items in this reference that may be taken to indicate the presence of extraordinarily wet digging; namely,

December 15th, 1920	....	Flooded - water
February 26th, 1921	....	Pontoons
" 26th, "	....	Moving pontoons.

Appendix 10.....4.6.

Cost Summary
July 10, 1943.

All shovels on rock surface while digging earth excavation used pontoons whether the excavation was exceptionally wet or only ordinarily so, in order to facilitate moving. It may be safely taken that No. 8 would have removed twice as much as No. 12 at the same cost, if the nature of the digging had been the same and the height lifted equal.

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The actual shifts of each shovel are multiplied by the rated dipper capacity to bring it to the shifts required had the dipper been 1 cubic yard. Combining the output of 88 with its cost and comparing with 112 as the cost basis there results what might be called "true" efficiency. In March 88 takes out 100.5 of 112 at a cost of 50% or an equivalent value of 170.34. 112 in March takes out 100.2 of 112 at a cost of 50% or an equivalent value of 167.24. 112 in March takes out 100.2 of 112 at a cost of 50% or an equivalent value of 167.24. 112 in March takes out 100.2 of 112 at a cost of 50% or an equivalent value of 167.24.

April 12, 1944

All records of the United States Government are
deposited in the Library of Congress and are
available to the public. It is not the policy of the
Library to make copies of these records for
distribution. If the nature of the request has been
the same and the request is equal.

COPY

Appendix 10. Sec. 3.

Cost Department,
July 12, 1923.

EFFICIENCY, COST & COMPARISONS OF SHOVELS

NO. 8 ELECTRIC & NO. 12 STEAM

TO - DECEMBER 31, 1921.

SHOVEL NO.		NO. SHIFTS WORKED.	QUANTITY EXCAVATED.	NO. CU. YDS. PER SHIFT.	SIZE OF DIPPER.	SHIFTS ON 1 CU. YD. DIPPER BASIS.	EFFIC- IENCY.	ACTUAL COST PER CUBIC YARD.
Shovel #8	Earth	909	1,876,422	2,064	8 Cu.Yd.	7,272	258	.98
	Rock	439	464,526	1,058	6 Cu.Yd.	2,634	177	4.24
Shovel #12	Earth	311	596,713	1,920	8 Cu.Yd.	2,438	239	1.56
	Rock	277	210,527	760	6 Cu.Yd.	1,662	127	5.08

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NOTE: In order to determine a Common Comparative Figure called "Output Efficiency" the actual shifts of each shovel are multiplied by the rated dipper capacity to bring it to the shifts required had the dipper been 1 cubic yard. Combining the output of #8 with its cost and comparing with #12 on the same basis there results what might be called "Cost" efficiency. In Earth #8 takes out 106.5 of #12 at a cost of 63% or an equivalent ratio of 170 to 100 and in Rock #8 takes out 139.2 of #12 at a cost of 83.5% or an equivalent ratio of 167 to 100 notwithstanding that #12 in both Earth and Rock was in shallow cuts.

Good Payment
 July 12, 1933

July 12, 1933

RECEIPT FOR CASH & CREDIT OF THE

W. J. FRANK & CO. IS HEREBY

TO - RECEIVED \$1,000.00

DATE	AMOUNT	PAID TO	BY	FOR	REMARKS
7-12-33	1,000.00	W. J. FRANK & CO.	CASH	1,000.00	PAID TO W. J. FRANK & CO.
7-12-33	1,000.00	W. J. FRANK & CO.	CASH	1,000.00	PAID TO W. J. FRANK & CO.
7-12-33	1,000.00	W. J. FRANK & CO.	CASH	1,000.00	PAID TO W. J. FRANK & CO.
7-12-33	1,000.00	W. J. FRANK & CO.	CASH	1,000.00	PAID TO W. J. FRANK & CO.

COPY

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THE RECEIPT IS VALID FOR THE PURPOSE OF THE RECEIPT ONLY.

multiplied by the rated dollar amount to bring it to the
 dollar required and the dollar then 1 dollar paid. Comparing
 the output of 30 with its cost and comparing with 30 on the
 same basis there results what might be called "Cost" 30-
 30. In March 33 takes out 100.5 of 30 at a cost of
 30 or an equivalent ratio of 100 to 30 and in March 33
 takes out 100.2 of 30 at a cost of 30.5 or an equivalent
 ratio of 100 to 30 notwithstanding that 30 in both March
 and April was in dollar cost.

APPENDIX 10. Sec. 4.

EFFICIENCIES STEAM VS ELECTRIC SHOVEL.
LARGE TYPE SHOVELS IN ROCK.

The ideal conditions under which these shovels can be equitably compared, obtain where the nature of the excavation is the same for all shovels; where train service is equal; where the depths of cuts or heights lifted are the same; where the shovels are all working at the same time of year, and where the shovels are the same age, or at the same stage of depreciation. The nearest approach to these conditions was during the period of July to November, inclusive in the year 1931, where the three electric 225-B shovels Nos. 1, 2 and 8 and steam shovels Marion 300 and 225-B, Nos. 11 and 12, were working south of Lundy's Lane in rock excavation. However, the heights lifted were not the same, the ages of shovels were not the same, and train service not equal, the advantages under these heads being almost wholly with the steam shovels.

The attached tabulation shows the average output per shift, the average depth of cut, and the monthly unit cost for each shovel for the period. This tabulation is quite self-explanatory, and it requires no further argument to prove the superiority of the electric shovels over the steam, as regards both production and economy, and in spite of the fact that the electrics were from two to three years old, and the steams brand new, and that the electrics were working in much deeper cuts and with more congested loading tracks, than the steam shovels.

No. 2 shovel was handicapped by digging out at station 150± and being

The first of these is the fact that the
 results of the tests are not in any way
 affected by the position of the body in
 space. This is a very important point
 to remember, as it shows that the
 results are not due to any particular
 position of the body. This is a very
 important point to remember, as it
 shows that the results are not due to
 any particular position of the body.

Appendix 10 2.

dismantled and re-assembled in October, digging in at station 100 and digging out at station 106 in November.

Comparing these shovels on the same basis of monthly output per shift, depth of cut, and cost per cubic yard, it will be seen that the electric shovels make a considerably better showing, particularly when the effect of the depth of cut is applied.

From a test of electric shovel No. 1 on May 28th, 1920, when digging in rock section of canal, with a depth of cut of 46 ft., the time of cycle was 53.2 seconds. The same shovel, while in a 30 ft. cut in rock section of canal on December 9th, 1920, gave a cycle time of 43 seconds. So that on the assumption that in the two depths of cut the total time of actual digging operations were the same, the output should be 24% greater for the shallow cut or at a ratio of 31 to 25, under equal train service and weather conditions, etc. In other words, the actual digging costs should be in ratio of 25 to 31.

Actually, the output for December 29th, 1920, day shift, when the test was taken, was 1,050 cubic yards car measure, which corrected to bank measurement was 785 cubic yards and on December 9th, day shift, the output was 730 cubic yards car measure, or 760 cubic yards bank measurement. However, for May 28th the delays were 1.155 hours, leaving 8,845 working hours, and on December 9th, 1920, 3.083 hours, leaving 6,917 working hours, so that for the same actual operating time the output on December 9th should be

$$\frac{8845}{6917} \times 760 \text{ c.y.} = 932 \text{ cubic yards} = 127\% \text{ of May 28th, or } 27\% \text{ greater than on May 28th, 1920.}$$

Comparing electric shovels Nos. 1 and 3 with steam shovel No. 11 where,

Appendix 10 3.

with the two former ones the depth of cut was 61 ft. as against 23.4 ft. for No. 11, it should be expected that, all other conditions being equal, No. 11 should have an output of at least 50 to 35% greater than either No. 1 or No. 8. Actually, it had an output per shift for this five months of only 77% of No. 1 and 82% of No. 8 while the averages of total monthly unit costs was 117% of No. 1 and 112% of No. 8. Furthermore, the records show that No. 11 had by December 1st, 1921 removed a total excavation of 1,260,000 cubic yards and No. 1 had removed 2,380,000 cubic yards and of the total for No. 11 only 201,800 cubic yards were rock and for No. 1 - 1,523,400 cubic yards. In other words, with a removal of over $7\frac{1}{2}$ times the amount of rock excavation (which is the real criterion of depreciation) No. 1 shovel took out in the last five month period of work 30% more rock per shift and at an average monthly cost of 86% of No. 11. This is equivalent to 150% of No. 11 at the same cost, notwithstanding the severe depreciation of wear and tear from having taken out $7\frac{1}{2}$ times the amount of rock excavation, and notwithstanding its working in a cut over $2\frac{1}{2}$ times as deep. These relative efficiencies of electric vs steam shovels of 150 - 100 are determined by their performances during the best working period of the year in July to November, inclusive, and if the full year's record were the basis of comparison, this ratio, under ordinary conditions of construction, becomes at least 180 to 130. For, with a value of 150 for 12 months and 100 for 10 months (which period is a maximum for steam shovels) there results a ratio of 130 to 100. Over and above this, there should be applied the effect of depreciation, and if it had been possible to compare the two shovels under the same conditions of not only depreciation but depth of cut, time of season, labor

... of ...

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Appendix 10.....4.

efficiencies, etc., it would undoubtedly have resulted in a ratio of cost of close to 200 to 100 in favor of the electric shovel.

For, applying a conservative value of 25% of actual digging time gained had No. 1 been in shallow cut, the output of No. 1 would have been 125% of 130% of No. 11 or about 163%, which, at 85% of cost of No. 11 = 190% of No. 11. Adding the effect of depreciation, this easily becomes 200%.

This is corroborated by data prepared, dated October 26th, 1921 (copy attached) showing records of shovels Nos. 1, 2, 8, 11 and 12 in rock excavation to September 30th, 1921.

No. 1 electric shovel started rock excavation May 1919 and dug 29 months with an average man hour rate of 57.0¢ per hour.

No. 2 electric shovel started rock excavation August 1919, and dug to September 30th, 1921 (less months of March to October 1920) at an average man hour rate of 57.8¢ per hour.

No. 8 electric shovel started rock excavation February 1921 and dug eight months at an average man hour rate of 61.6¢ per hour.

Mean equivalent of the three electric shovels = 55 months at 59¢.

No. 11 steam shovel started rock excavation July 1921 and dug three months at an average man hour rate of 59.4¢.

No. 12 started rock excavation in May 1919 and dug five months at an average man hour rate of 60.7¢ per hour.

Mean equivalent of Nos. 11 and 12 = 8 months at 60.2¢.

Total rock removed by Nos. 1, 2 and 8 = 2,673,823 cubic yards in 2,063 shifts = 1,027 cubic yards per shift of ten hours.

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Total rock removed by Nos. 11 and 12 = 242,689 cubic yards in 324 shifts =

749 cubic yards per shift of ten hours.

The unit price of electric shovels is \$3.55 per cubic yard and the unit price of steam shovel is \$4.75 per cubic yard.

The electric shovel removed 137.2% of steam per shift and at a cost of 75% of steam, or the equivalent of 193% of steam at the same cost. These shovels also worked all the year round while the steam worked the summer months, and in addition the comparative depths of cut for the electric and steam shovels were as follows:

No. 1	-	1,465,437	cubic yards at	50' out
" 2	-	815,874	"	46' "
" 3	-	392,512	"	51' "
		2,673,823	"	50.4' "

For steam:

No. 11	-	106,557	cubic yards at	23.4' out
No. 12	-	136,132	"	61' "
		242,689	"	44.4' "

From previous tests, it was established that a ratio of cut or lift of 23 to 46 made a difference of 24% in the output, or 100 to 167 gives an increase of 24% in output. On the same basis 44.4 to 50.4 should give 16% greater output for the shallow cut - $\frac{193}{100} \times 116 = \text{final cost} - 212\%$. Modifying this for an equivalent man hour rate, it becomes $\frac{580}{502} \times 212 = 234\%$. In other words, for equivalent cost, the electric shovels on the Flagara work produced 234% of the steam shovels.

1880

* While all of these things are true, it is not as if we are being deceived.

0-1100H not to strike your elbow side Q17

How can we keep order and still be a family? It's not an easy thing to do.

which allow my CTAs to locate users to enter

NOT TO BE USED FOR ANY OTHER PURPOSES THAN THAT FOR WHICH IT WAS DESIGNED

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For example, the 1975 Census of the United States found that 10% of the population was aged 65 and over, and that 10% of the population was aged 18 and under.

THE 1998 JOURNAL OF THE IMA - 1998 JOURNAL OF THE IMA - 1998 JOURNAL OF THE IMA

1. The following information was obtained from a review of the records of the Department of the Interior, Bureau of Land Management, and the Bureau of Reclamation, regarding the land ownership and management of the area described in the title of this report.

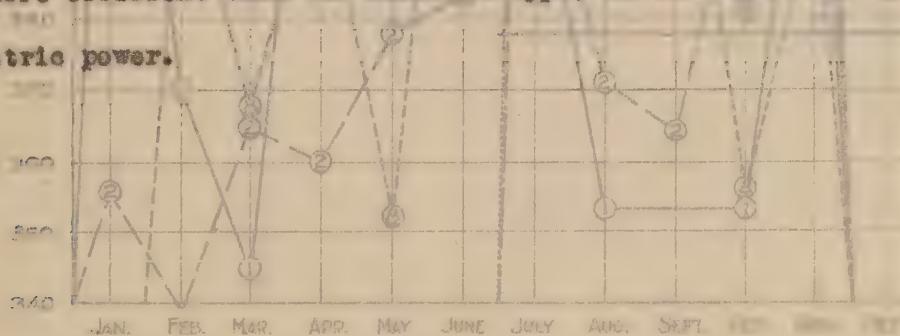
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Appendix 10 6.

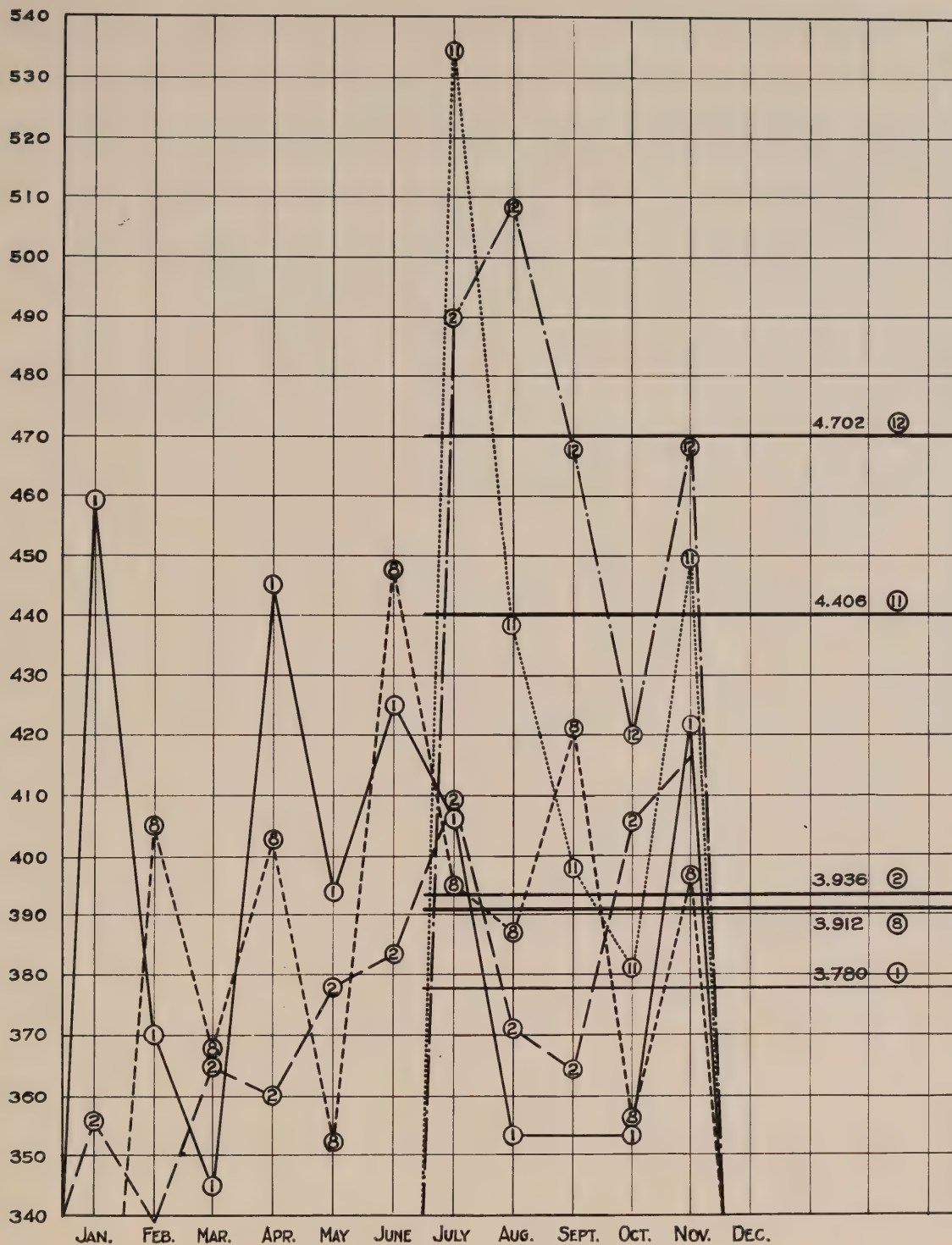
The following is quoted from the Bucyrus catalogue 19-A, page 11:

"It may be said, however, that their greater high cost is more than compensated by their more economical operation, saving in track shifting, etc. To quote one instance; a large mining company originally loaded ore with standard railroad type steam shovels at a cost of 21 cents per ton. They installed electric shovels of the same type and reduced this cost to 7 cents a ton. They now are loading the same material with a 225-B Bucyrus electric shovel at a cost of 3 cents a ton."

The catalogue from which this is quoted was issued in May 1920 and would therefore refer to conditions analogous at least as to time and kind of equipment, to the Niagara job. The prices quoted most emphatically corroborate the results obtaining on the Hydro work at Niagara; namely, that the electric shovels are conservatively twice as efficient as steam and that the 225-B type is more efficient than the railroad type, whether both are operated by steam or electric power.

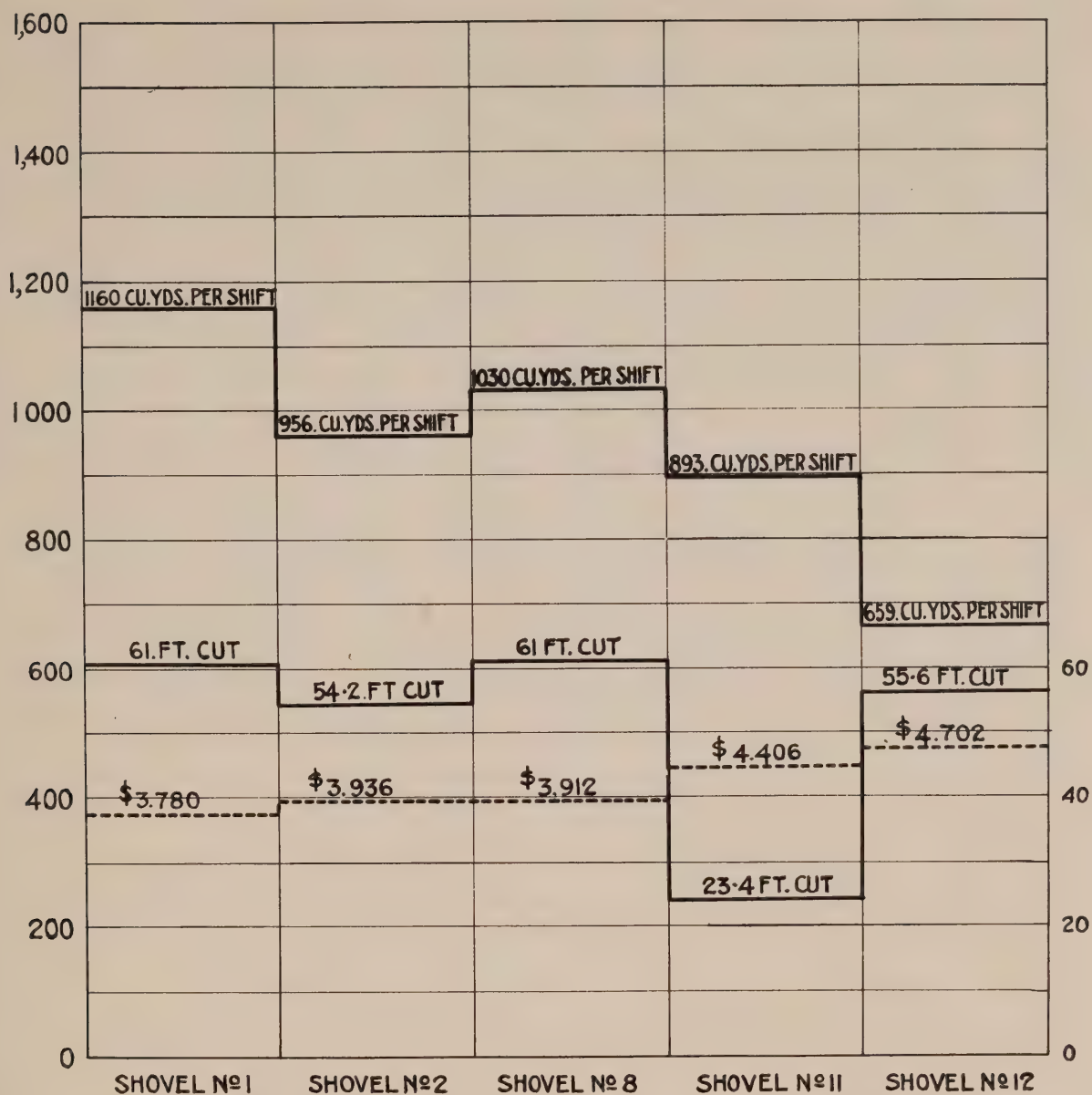


APPENDIX 10-CHART A
MONTHLY UNIT COSTS
SHOVELS 12.8.11 AND 12
JULY TO NOVEMBER 1921



APPENDIX 10-CHART A
**MONTHLY UNIT COSTS
 SHOVELS 1, 2, 8, 11 AND 12
 JULY TO NOVEMBER 1921**

June, 1923



APPENDIX 10 - CHART B
 OUTPUT PER SHIFT, HEIGHT OF LIFT
 AND MONTHLY UNIT COSTS
 FOR SHOVELS 1,2,8,11, AND 12
 FOR JULY, AUG, SEPT, OCT, AND NOV, 1921

June, 1923.

APPENDIX 10. Sec. 4.

| MONTH | E.L.C. SHOVEL NO. 1 | | | E.L.C. SHOVEL NO. 2 | | | E.L.C. SHOVEL NO. 3 | | |
|---------|-----------------------|----------------|------------|-----------------------|----------------|------------|-----------------------|----------------|------------|
| | AMOUNT | DEPTH | UNIT | AMOUNT | DEPTH | UNIT | AMOUNT | DEPTH | UNIT |
| | PER SHIFT
CU. YDS. | OF CUT
FEET | COST
\$ | PER SHIFT
CU. YDS. | OF CUT
FEET | COST
\$ | PER SHIFT
CU. YDS. | OF CUT
FEET | COST
\$ |
| 1921 | | | | | | | | | |
| July | 1,100 | 61 | 4.06 | 1,060 | 46 | 4.10 | 1,160 | 61 | 3.95 |
| Aug. | 1,170 | 61 | 3.53 | 950 | 61 | 3.71 | 1,080 | 61 | 3.87 |
| Sept. | 960 | 61 | 3.53 | 930 | 61 | 3.64 | 870 | 61 | 4.21 |
| Oct. | 1,030 | 61 | 3.53 | 1,200 | 61 | 4.06 | 925 | 61 | 3.56 |
| Nov. | 1,540 | 61 | 4.22 | 740 | 42 | 4.17 | 1,115 | 61 | 3.97 |
| AVERAGE | 1,160 | 61 | 3.78 | 956 | 54.2 | 3.936 | 1,030 | 61 | 3.91 |

| MONTH | STEAM SHOVEL NO. 11 | | | STEAM SHOVEL NO. 12 | | |
|---------|-----------------------|----------------|------------|-----------------------|----------------|------------|
| | AMOUNT | DEPTH | UNIT | AMOUNT | DEPTH | UNIT |
| | PER SHIFT
CU. YDS. | OF CUT
FEET | COST
\$ | PER SHIFT
CU. YDS. | OF CUT
FEET | COST
\$ |
| 1921 | | | | | | |
| July | 575 | 16 | 5.35 | 710 | 42 | 4.85 |
| Aug. | 860 | 22 | 4.39 | 800 | 52 | 5.09 |
| Sept. | 995 | 28 | 3.98 | 570 | 60 | 4.68 |
| Oct. | 1,075 | 25 | 3.81 | 545 | 60 | 4.20 |
| Nov. | 940 | 26 | 4.50 | 670 | 60 | 4.69 |
| AVERAGE | 893 | 23.4 | 4.406 | 659 | 55.6 | 4.702 |

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Appendix 10.

October 26th, 1921.

| | LARGE AND
MATERIAL,
EXCAVATION,
LOADING. | LABOR AND MATERIAL
EXCAVATION, LOAD-
ING, DRILLING AND
BLASTING | TOTAL
PER YARD |
|---|---|--|-------------------|
| Cost per yard of rock excavation - | | | |
| 225-B electric shovel | \$.72 | \$ 2.06 | \$ 3.55 |
| Cost per yard of rock excavation - | | | |
| 225-B steam shovel | 1.12 | 2.53 | 4.75 |
| Average power for 225-B electric shovels | | 370 HP | |
| " energy " " " " per cubic
yard production | | 1.35 KW hours | |
| Cost of power per yard for 225-B electric shovels - rock ... | | .51¢ | |
| " " energy " " " " " - earth .. | | .273¢ | |
| Peak load for 225-B shovels | | 795 HP | |
| Pounds of coal per yard - 225-B steam shovels | | 27.7 lbs. | |
| Rates paid shovel operators (runner) | | .87¢ (11 hours) | |
| (cranesman) | | .68¢ (11 hours) | |
| 225-B steam shovel uses 450 tons of coal per month (2 shifts) | | | |

AMERICAN IS.

| DATE | DESCRIPTION | AMOUNT |
|------|----------------------|--------|
| 1911 | PAID TO AMERICAN IS. | 1.12 |
| 1911 | PAID TO AMERICAN IS. | 1.12 |
| 1911 | PAID TO AMERICAN IS. | 1.12 |

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APPENDIX 11.CONDITIONS INFLUENCING THE LOWER
OUTPUT OF SHOVELS, RESULTING IN INCREASED COSTS AND DELAYS.

Reported actual shovel records, and the observed performance of the newer type of revolving shovels at other points, appeared to be the best possible evidence that, with conditions equal, the Commission could well depend upon equal or better shovel performance on the work at Niagara, on account of having the advantage of cheap electric power and an unsurpassed dumping ground of over 200 acres, with an average depth of 65 feet.

The borings made at about 100 foot intervals, over the line of canal, gave no evidence that unstable ground would be encountered, and while showing fine sand underlying the top strata and overlying gravel and hardpan next the rock, there was no evidence of flow of water under pressure originating from the rock as ultimately developed. Neither did it appear that there was any flow of water from the fine sand which later proved quicksand. Water was encountered in the borings when rock was reached, but it could quite naturally be assumed that it was of the usual ground surface origin and would readily drain into the shovel cut when opened to the rock. However, after the overburden was removed, it was found, that, while water continued to flow through the gravel and sand strata, reducing the ground water level in the adjacent districts, heavy flows of water were also encountered at frequent intervals originating under pressure from rock fissures. This latter condition was the prime cause of wet excavation which ultimately had so serious an effect in the

[illegible]

Appendix 11 2.

output of the shovels, and the delays in the disposal. The frequency of these springs kept the ground impregnated with water at or near the surface of the rock causing serious and frequent slides into the shovel cut as it was opened, and expensive trouble and delays in the operation and the disposal of the spoil. Under normal conditions it is expected that shovel cuts in earth would have water present, but in practically all cases, it originates from the surface and readily drains away when relief is provided by the excavated cut. On the contrary, the springs encountered in the cut at Niagara, appeared to flow at undiminished rates, in consequence of which there was no relief by drainage. This abnormal condition was evidenced by the large volumes of water that were being pumped from the canal section as late as the summer of 1920, long after the shovels had passed in the earth excavation. This condition was, therefore, primarily, the cause of not only greatly reducing the output of the large shovels, but of seriously affecting its disposal.

The train of evils resulting from the wet excavation may be enumerated in general as follows:

(1) - The loading of cars was restricted on account of the slopping over. Of course, if it were physically possible to place dipper loads exactly in their proper centre positions in the cars, the settlement would be even, and at most 20 cubic yards could be given each car, but it is quite evident that in practice this is out of the question and the results were that throughout the entire work of all earth excavation, the average carload in wet and dry excavation was 17 to 18 cubic yards for a 20 cubic yard car.

(2) - Delays at the dump due to wet material sticking in the cars, and

1875-1876 25 211-212

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The trial at which testimony from the two assassins was heard, is
summarized as follows:

111 - On finding as above was represented as indicated at the attached copy of report. It is very respectfully requested that the above be made a part of the report of the committee on the subject of the proposed amendment to the constitution of the National Association of Manufacturers.

DOI: 10.1002/anie.200500016

Appendix 11. 3.

frequently having to be shovelled out.

(3) - The sliding of the dump itself, often taking track and cars with it. This often reduced the number of available dumping points, causing trains to wait for space at the dump.

(4) - Immediately following the excavation by shovel, it became necessary to dump train loads of rock from the loading track to hold up the sides of the cut, not only to prevent the sides from going into the cut, but to support the loading track as well. While this was being done, the shovel, of course, could not load.

(5) - The frequent moving back of the shovel to avoid having the base buried by mud from the sides and face of the cut. This condition necessitated tedious delays in the cleaning up of the bottom and replacing of track. Frequently, rip-rap had to be re-handled and placed on the face of the cut immediately ahead of the shovel, particularly during comparatively short shut-downs between shifts or over Sunday.

(6) - The difficulties of keeping men in cuts of this kind, particularly when labor was so inefficient and independent. This resulted in the necessity of continuously training new men for this work.

(7) - As an instance of the inefficiency of labor - under ordinary conditions of shovel work, four men should be sufficient for doing the work of moving a 225-B shovel ahead, particularly in earth excavation, as this shovel was equipped to move its own track and pontoons, and the cut being ordinarily so deep that the number of moves would seldom exceed six per day, and was more often three to four. During the period when the work was in progress, the

January 10, 1900

My dear Sir,

I have the pleasure to acknowledge the receipt of your letter of the 10th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

I am, Sir, very respectfully,
Yours faithfully,
Walter J. Fawcett & Company

COPY

I am, Sir, very respectfully,
Yours faithfully,
Walter J. Fawcett & Company

I am, Sir, very respectfully,
Yours faithfully,
Walter J. Fawcett & Company

I am, Sir, very respectfully,
Yours faithfully,
Walter J. Fawcett & Company

Appendix 11,, 4.

ordinary crew in front of a shovel was eight men, and on more than one occasion the crew refused to work when even one of their number was missing.

(3) - The congestion which finally resulted in the south end of the work in the spring of 1921, with six shovels operating within a distance of two miles, and all loading on one side of the canal.

Another source of delay, while not connected with wet excavation, was the protracted series of negotiations covering particularly the agreement and plans for the combined bridge of the Grand Trunk and Michigan Central (Niagara Division).

This matter had been before the railway companies as early as December, 1918, yet upon the delivery of No. 2 shovel in January, 1919, it was quite evident that it would be impossible for this shovel to pass through the finished structure at the time scheduled; namely, May or June, 1919. It was therefore decided to erect the shovel on the south side of the bridge. To keep this unit working it was necessary to work in railway excavation and dispose of the output in small depressions in the Whirlpool yard location. This resulted in reduced yardage and actual delay in taking out canal excavation for which the shovel was purchased. The final excavation of earth under the arch bridge was not completed until June, 1919, and the rock not until August, 1921.

Even No. 1 shovel, which had completed the greater percentage of earth and rock excavation north of the bridge by January, 1921, had to be dismantled and re-assembled in its new location south of the bridge, on account of not having right-of-way underneath.

When it was decided to start No. 2 south of the bridge, the gravity of

1894

Division:
for the limited bridge of the Grand Trunk and Western General (Western
proposed a series of negotiations covering particularly the cement and glass
market, which is being held in the hands of a few
men, and the result of the negotiations will be of great importance to the
Division.

Small June, 1919, and the rock not until August, 1921.

There is no. I should, which had suggested the number of persons in
the family, which was the basis of the policy, and it is estimated in
the family in the case of the policy, and it is estimated in the case of
the family in the case of the policy.

Appendix 11 B.

the delay on the bridge negotiations had not developed to serious proportions, except that it was necessary to provide passage for trains serving the shovels working north of the bridge, which had to dispose of part of this output at other points than those provided north of the bridge. This was on account of the yardage being increased beyond the original project, in which it was contemplated to dispose of all of it north of the bridge location.

COPY

APPENDIX 12
DRAWING COMPLETE
TRACK LAYING
TRACK MAIN LINE
CONSTRUCTION RAILWAY
KEY PLAN FOR 5 SHEETS FOLLOWING

1980-1981 24. 11. 1980

the following analysis of equipment for the investigation of the case of the missing person, it is suggested that the following equipment be developed to assist in the investigation of the case of the missing person.

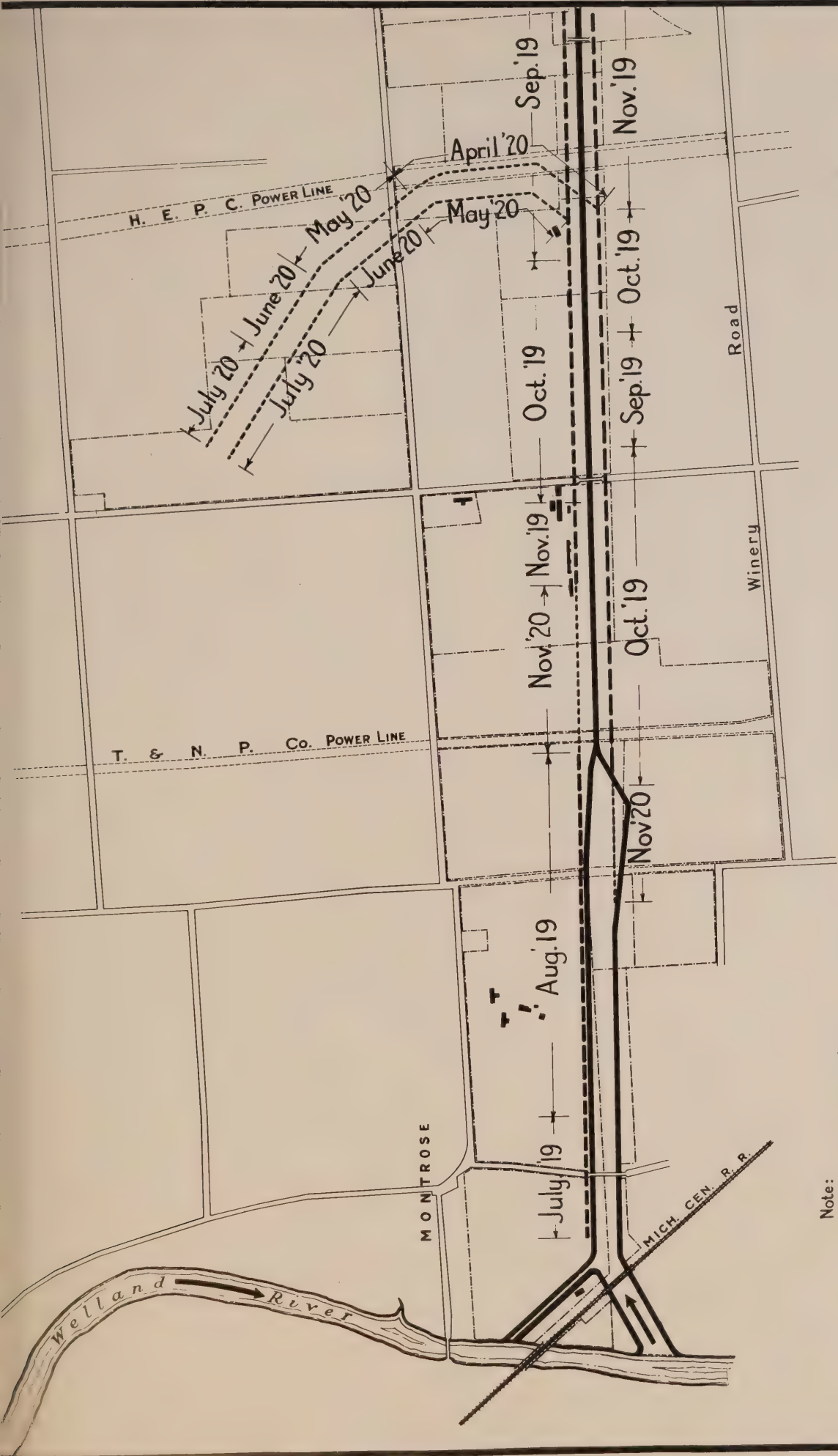
УДОБНО



APPENDIX 12

PLAN SHOWING COMPLETION OF TRACK LAYING, DOUBLE TRACK MAIN LINE CONSTRUCTION RAILWAY KEY PLAN FOR 5 SHEETS FOLLOWING

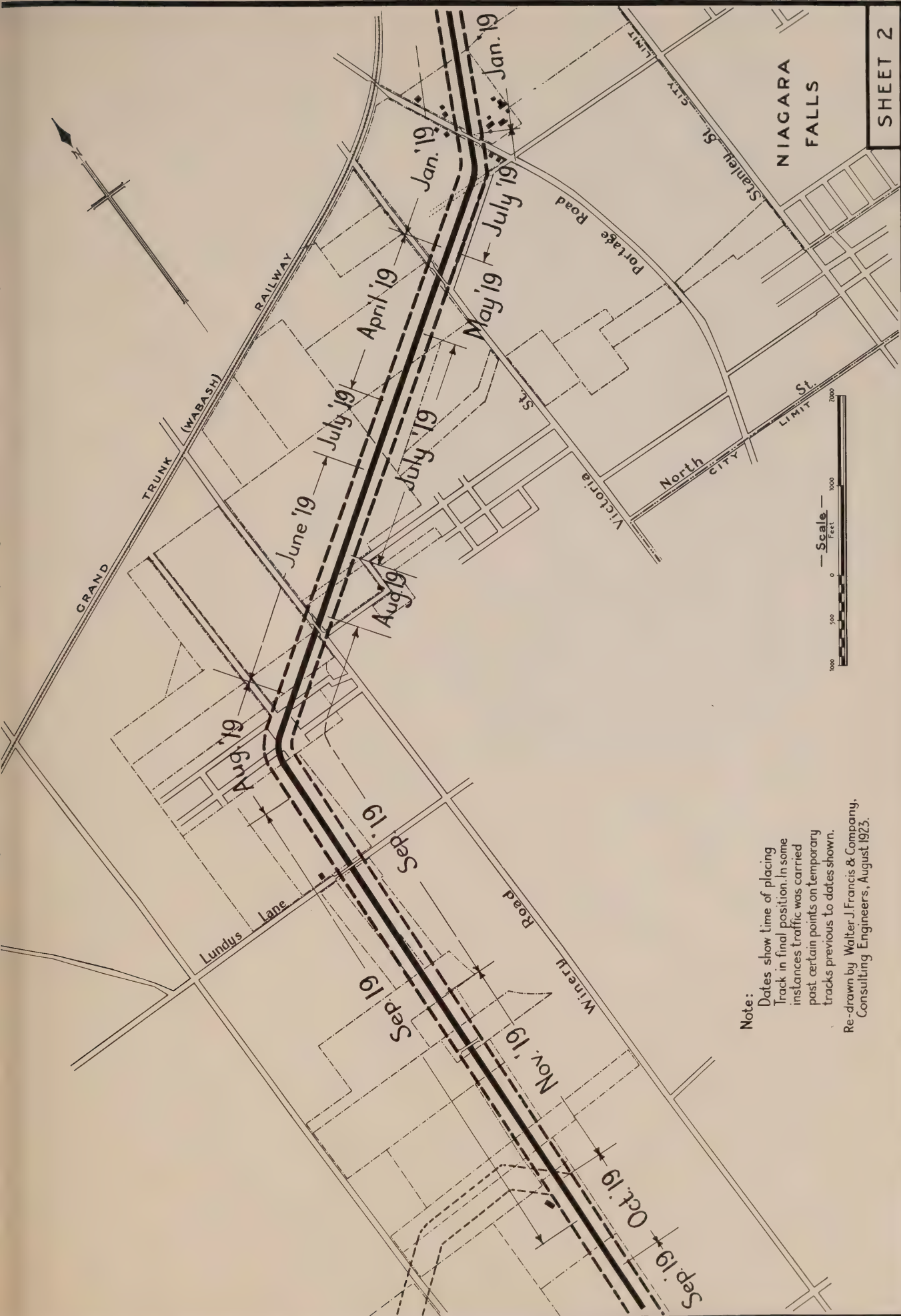
Re-drawn by Walter J Francis & Company, Consulting Engineers, August 1923.



Note:
Dates show time of placing
Track in final position. In some
instances traffic was carried
past certain points on temporary
tracks previous to dates shown.

Re-drawn by Walter J. Francis & Company,
Consulting Engineers, August 1923.

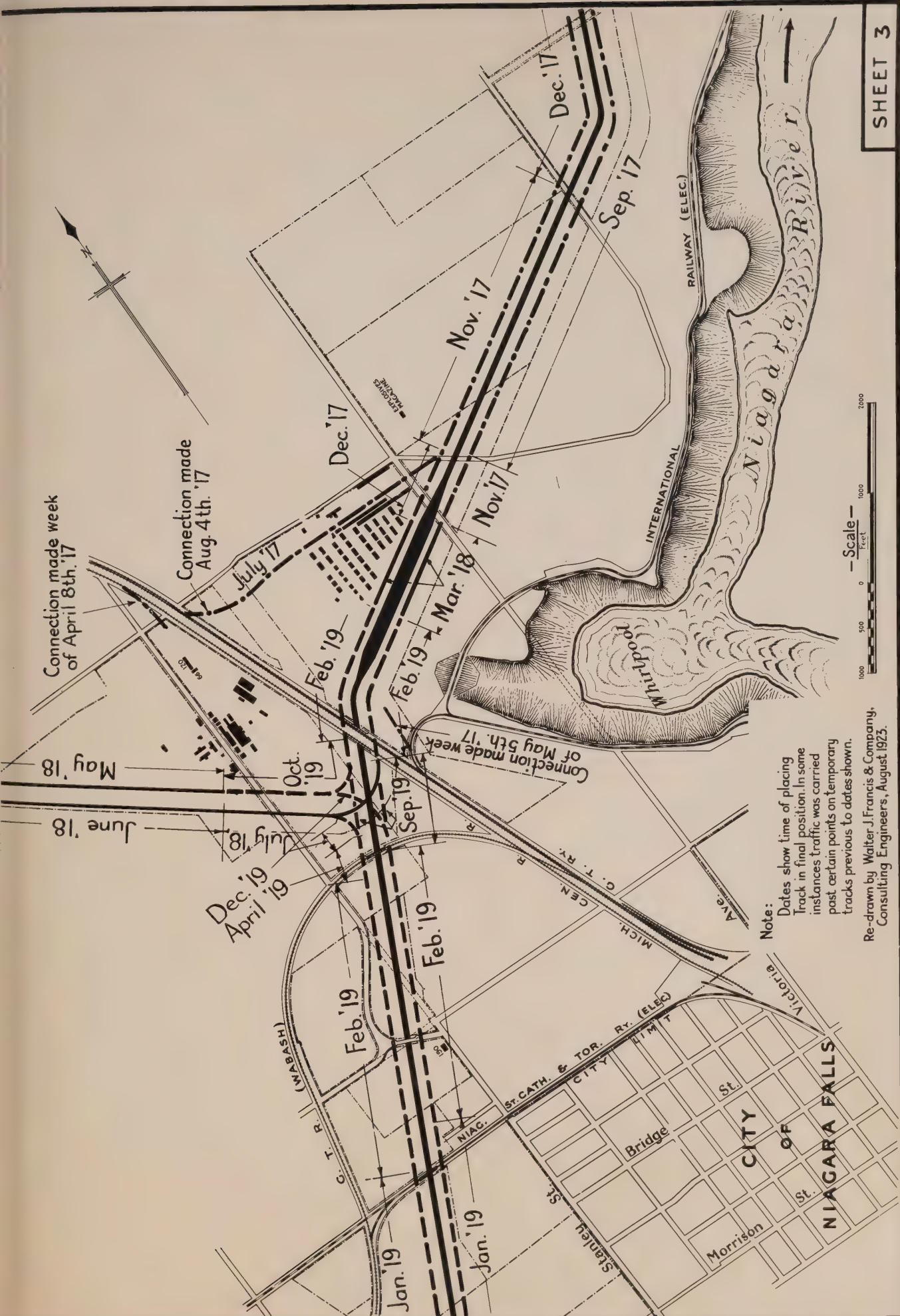
NIAGARA
FALLS



Note:

Dates show time of placing
Track in final position. In some
instances traffic was carried
past certain points on temporary
tracks previous to dates shown.

Re-drawn by Walter J Francis & Company,
Consulting Engineers, August 1923.





Note:
Dates show time of placing
Track in final position. In some
instances traffic was carried
past certain points on temporary
tracks previous to dates shown.

Re-drawn by Walter J. Francis & Company,
Consulting Engineers, August 1923.

APPENDIX 13.

COST OF ROCK AND EARTH EXCAVATION, CONCRETE FOR LINING AND RETAINING WALLS, AND RIP-RAP FOR CANAL, FURROW AND SCREEN-HOUSE (EXCLUSIVE OF REINFORCED CONCRETE IN SCREEN-HOUSE) ACCORDING TO PRICES TENDERED FOR 11 SECTIONS OF THE CALUMET-SAG CANAL NEAR CHICAGO, AND THE CONTRACT PRICES AND ACTUAL COST OF THE ROCK EXCAVATION FOR THE LIVINGSTONE CHANNEL IN THE DETROIT RIVER.

These works were prosecuted during the years 1910 to 1916.

The Calumet-Sag prices will be discussed under three headings:

COPY

(1) - By using the lowest price bid in each of the 11 sections for each specified item, irrespective of whether this price is in the lowest complete tender bid or not.

(2) - By using the average of all the prices tendered on the same 11 sections for specified items.

(3) - By using the price appearing for each specified item in the accepted tender for each section.

The 11 contracts of the Calumet-Sag canal work consisted of 7,856,000 cubic yards of glacial drift or earth excavation; 1,723,000 cubic yards of rock excavation; 965,300 square feet of channeling; 348,500 square yards of rip-rap; 31,075 cubic yards of No. 1 concrete; 30,950 cubic yards of No. 2 concrete; 14,795 lin. ft. of roadways; and miscellaneous items including bridges, etc.

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AUTHORITY: 5 U.S.C. 552 A(1) DEXTER
DATE 08-19-2010 BY 60322 UCBAW/SJS/KSP/STP

These wires were purchased during the years 1910 to 1916.

Off-campus use will be charged only when necessary.

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(2) - to extend the Freedom of Information Act to cover all material for which

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— 2nd ed. 1978. 70.000.

11. *How can we determine whether a set of points is linearly separable?*

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(1) \rightarrow If \mathcal{A} is a \mathcal{C} -algebra, then \mathcal{A} is a \mathcal{C} -algebra.

...and the ...

1. The following are the names of the persons who have been identified as having been in contact with the subject of this investigation:

Appendix 13 2.

The following table shows the quantities of the various main items for each section, with the dates on which the bids were opened. Contracts Nos. 6 and 13 are not included, the data for the same not being available.

| SEC-
TION | BIDS
OPENED | C.Y.
GLACIAL
DRIFT | C.Y. ROCK | SQ. FT.
CHANNELING | SQ. YDS.
RIP-RAP | C.Y. NO. 1
CONCRETE |
|--------------|----------------|--------------------------|-----------|-----------------------|---------------------|------------------------|
| 1 | Jul. 25/14 | 520,000 | 315,000 | 270,000 | 500 | 10,050 |
| 2 | Oct. 5/11 | 221,000 | 351,000 | 313,000 | - | 3,200 |
| 3 | Feb. 15/12 | 335,000 | 220,000 | 182,300 | 5,000 | 13,400 |
| 4 | Aug. 10/11 | 783,000 | 121,000 | - | 37,000 | - |
| 5 | May 31/12 | 1,070,000 | 141,000 | - | 69,000 | 375 |
| 7 & 8 | Jul. 19/13 | 2,550,000 | 15,000 | - | - | 1,200 |
| 9 | Sep. 11/13 | 875,000 | 50,000 | - | 70,000 | 1,100 |
| 10 | Apr. 13/13 | 670,000 | 300,000 | - | 72,000 | 800 |
| 11 | Mar. 12/14 | 750,000 | 25,000 | - | 70,000 | - |
| 12 | May 21/14 | 485,000 | 125,000 | 100,000 | 25,000 | 950 |
| | | 7,856,000 | 1,723,000 | 965,300 | 348,500 | 31,075 |

The depths of cuts were favorable for the operation of the largest and most modern types of excavating machinery which were in actual operation when the work was visited. (See Appendix 1 of Mr. Goodwin's report on Excavation Methods.)

The total excavation of 9,579,000 cubic yards of material in the 11 sections which added to Sections Nos. 6 and 13 (not available at the time) compares more closely than any other contemporary work, with the excavation of 14,420,000 cubic yards of material on the Queenston-Chippawa Development.

Not only was there similarity in magnitude, but the nature of the excavation and the conditions under which the work was done, appeared to correspond very closely to what the data, at that time, indicated for the Queenston-Chippawa

Appendix 13 3.

work: The sides of the cut were excavated, and

There were 34 bidders on these 11 sections. The bids were tendered between the years 1911 and 1915 and the work was still in progress in 1916.

The average prices for rock excavation for the 11 sections forcibly illustrate the influence that large quantities have on prices tendered. This is shown on the curve attached hereto, and indicates the relationship between quantities involved and prices bid. This curve shows that, with all other conditions similar, the prices tendered for large yardages are in a marked degree less than where the quantities are small. This fact indicates the justification for considering the item of magnitude in assigning a unit price for the excavation of the 4,357,415 cubic yards of rock involved in the Queenston-Chippawa work under one construction administration, as against 1,723,000 cubic yards of rock under eleven separate and distinct organizations on the Calumet-Sag. and along the

It may, therefore, be reasonably concluded that the prices obtaining on these various contracts were greater than would obtain under otherwise similar conditions for the Queenston-Chippawa excavation work.

The work of rock excavation for the Livingstone Channel in the Detroit River was done for the United States Government.

The original plan was to cut a 300 ft. channel 4,100 ft. long, to a depth which would provide 23 ft. of water. It was subsequently lengthened to 5,600 ft. and widened to 450 ft.

The 1,500 ft., which was lengthened northwards, was originally a dredge contract, but was sub-let to Grant-Smith and Company, who had the main channel

Efficient Use of Time

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Reference: The Bureau will not issue any more affidavits for 1962.

The research found the most significant risk for sexual violence

REPLY TO THE ABOVE, ONLY WHEN NECESSARY. (SEE INSTRUCTIONS ON REVERSE SIDE)

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James Earl Ray, was convicted and sentenced to death for the assassination of Dr. Martin Luther King, Jr. on April 4, 1968. Ray was executed by hanging on April 3, 1970.

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-insert 1 of 14 smaller images available for reference only. See page 10 for more.

2001

12. The Committee is requested to consider the possibility of establishing a permanent committee to monitor the situation in the field of human rights in the country.

These studies are being conducted in the following areas:

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THE OFFICE OF THE ATTORNEY GENERAL

1944-1945

THE ORIGINAL FILE WAS IN THE OFFICE OF THE ATTORNEY GENERAL

which would provide 25 ft. of water. It was subsequently determined to be 200 ft. 2

..77 014 37 December 1940

The 1,000 ft., which was lightened in 1914, and

... who had the main trouble

Appendix 13 4.

work. The sides of the cut were channeled, but after the work was under way it was decided to widen an additional 150 ft., which obviated the necessity of any further channeling on the west side of the original 300 ft. channel, so that only about one-third of this side was channeled.

The original contract price was \$1.24 per cubic yard which included channeling and \$75,000.00 of cofferdam work, an additional \$25,000.00 being also spent on the cofferdam by the United States Government. This price (\$1.24) covered a channel 5,600 ft. long and 300 ft. wide. The price for widening was \$1.10 per cubic yard, the original cofferdam being sufficient for both widths.

The work was started in 1908 and completed in 1911.

The material encountered was limestone, very similar in formation to that at Niagara Falls. It was removed by three steam shovels, loading into skips, which were handled by three travelling cableways. The excavated material was dumped along the cut 50 ft. back from the channel sides. The work is said to have cost about 85 cents per cubic yard, including all charges.

The following is the distribution of the cost:

| | |
|---|-------|
| Cofferdam and removal (ends removed only) | 8.7% |
| Pumping | 13.9% |
| Channeling, including air, | 3.0% |
| Drilling, " " | 15.2% |
| Blasting | 17.5% |
| Excavation, including depreciation, etc. | 22.5% |
| Conveying and disposal of material | 18.5% |
| General expenses | 6.5% |
| | <hr/> |
| | 100 % |

Assuming 85 cents per cubic yard as the total cost, and deducting 10% as a charge for cofferdam and pumping, the cost of excavation under similar conditions

Appendix 13 5.

to the Queenston-Chippawa canal and forebay, would be about 72 cents per cubic yard. On unit cost basis, 1,227,777 cubic yards in the enlargement.

The original contract for the 1,500 ft. at the north end was to provide for a depth of 22 ft., but after it was sub-let to the contractor, Grant-Smith and Company, it was decided to increase the depth to 23 ft.

The total excavation in the final enlarged area (5600' x 450') was 1,227,777 cubic yards of rock. The price in the original contract was \$1.24 per cubic yard. The resulting price of the enlarged section, including cofferdam, pumping, channeling, etc., was \$1.14 per cubic yard. Exclusive of the cofferdam (\$75,000.00) this unit price becomes \$1.08 per cubic yard. In view of the restricted space and the consequent expensive and slow methods of handling the excavated material, it is reasonable to assume that with large shovels and direct disposal facilities, the price of \$1.08 should be reduced by 10 to 15%. Furthermore, leaving aside this feature, if the price of \$1.08 were reduced by a contractor's profit of 25%, it would become about 86 cents per cubic yard. As a matter of fact, the United States Government engineers' records of actual labor and material costs entering into the work, led them to believe that the actual cost was about 85 cents per cubic yard including unwatering costs. If the cofferdam were deducted this unit cost would become 79 cents per cubic yard, which includes pumping, channeling, etc.

Comparing this with the Niagara work and assuming that the pumping should be included, the price of 79 cents would be reduced (15%) to less than 70 cents per cubic yard when taken out by cars and locomotives instead of skips and cableways.

Memorandum to Mr. J. Allen Rose

Re: The proposed acquisition of the assets of the company, which is being sold to the company.

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Appendix 13 6.

Consideration should also be given here to the effect that large quantities have on unit cost; namely, 1,227,777 cubic yards in the Livingstone Channel as against 4,357,438 cubic yards at Niagara.

These two jobs, the Calumet-Sag Canal and the Livingstone Channel, constituted the only two contemporary pieces of work on the continent which approached anywhere near the Queenston-Chippewa Development in magnitude, or were in any way analogous as regards the nature of the work and the working conditions.

In the following tables, I, II, III and IV, the unit prices for earth, rock, concrete and rip-rap on the Calumet-Sag Canal have been tabulated under the three main headings specified on page 1 hereof, and these tables have been further summarized in tables **COPY** V, VI, and VII attached.

These three latter tables show the general averages for the unit contract prices on 11 sections of the Calumet-Sag Canal for earth, rock, concrete and rip-rap as follows:

| CLASS OF WORK | LOWEST
PRICE BID | AVERAGE
OF ALL BIDS | ACCEPTED
TENDER |
|------------------------|---------------------|------------------------|--------------------|
| Earth | \$0.309 | \$0.379 | \$0.326 |
| Rock - channeled | 0.865 | 0.904 | 0.878 |
| " unchanneled | 0.674 | 0.778 | 0.706 |
| Plain concrete | 5.85 | 7.13 | 6.66 |
| Rip-rap | 0.974 | 1.452 | 1.136 |

As previously mentioned, the corresponding contract price for rock in the Livingstone Channel, without cofferdam, and allowing for more efficient and rapid excavation methods, is 92 cents per cubic yard.

— 1888 —

...the following table, it is to be noted that the total number of cases is 10,000, and that the total number of deaths is 1,000. The following table shows the number of cases and deaths for each of the five years from 1950 to 1954.

[illegible]

is positively identified, the appropriate amount below the year in the
 Distribution Schedule, Section 641(b), and allowed the same election for
 each succeeding year, in its own right.

Appendix 13 72

A comparison of these various contract prices with the 1917 unit prices used in the Queenston-Chippawa estimates, is worked out hereunder:

ROCK - CHANNELLED:CALUMET-SAG:QUEENSTON-CHIPPAWAEXCESSIN %

| | | | | | |
|------------------------------|------|------|-------|------|------|
| Average of lowest bids | .865 | .... | 1.215 | .... | 40.5 |
| " " all | .904 | .... | 1.215 | .... | 34.4 |
| " " accepted bids | .875 | .... | 1.215 | .... | 39.0 |
| Livingstone Channel | .920 | .... | 1.215 | .... | 32.0 |

ROCK - UNCHANNELLED:CALUMET-SAG:

| | | | | | |
|------------------------------|------|------|-----|------|------|
| Average of lowest bids | .674 | .... | .95 | .... | 41.0 |
| " " all | .778 | .... | .95 | .... | 22.0 |
| " " accepted bids | .706 | .... | .95 | .... | 34.5 |

EARTH:CALUMET-SAG:

| | | | | | |
|------------------------------|------|------|------|------|-------------|
| Average of lowest bids | .309 | .... | .337 | .... | 9.0 |
| " " all | .379 | .... | .337 | .... | 11.0 (less) |
| " " accepted bids | .326 | .... | .337 | .... | 3.5 |

PLAIN CONCRETE:CALUMET-SAG:

| | | | | | |
|------------------------------|------|------|-------|------|------|
| Average of lowest bids | 5.85 | .... | 11.04 | .... | 89.0 |
| " " all | 7.13 | .... | 11.04 | .... | 65.0 |
| " " accepted bids | 6.66 | .... | 11.04 | .... | 65.0 |

RIP-RAP:CALUMET-SAG:

| | | | | | |
|------------------------------|-------|------|-------|------|------|
| Average of lowest bids | .974 | .... | 1.875 | .... | 92.5 |
| " " all | 1.452 | .... | 1.875 | .... | 29.0 |
| " " accepted bids | 1.136 | .... | 1.875 | .... | 65.0 |

...

A summary of the ...
...

...

...

| | | | |
|------------------------|-------|-------|-------|
| Average of lowest bids | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |

...

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| | | | |
|------------------------|-------|-------|-------|
| Average of lowest bids | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |

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| | | | |
|------------------------|-------|-------|-------|
| Average of lowest bids | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |

...

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| | | | |
|------------------------|-------|-------|-------|
| Average of lowest bids | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |

...

...

| | | | |
|------------------------|-------|-------|-------|
| Average of lowest bids | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |
| " " " " " " | 1.215 | 1.215 | 1.215 |

Appendix 13 6.

It will be seen that the percentages of excess estimated cost are the least in the case of earth. This is entirely consistent, as the use of electric power in place of steam would have the greatest economic effect where the yardage was greatest and where there were no special cost factors, such as channeling, drilling, blasting, etc., as in the case of rock, or where material costs were an essential factor, as in the case of concrete.

These comparative figures tend to further confirm the judgment of the Commission's engineers, and the engineers and contractors who advised them in 1916 and 1917.

In making the above comparisons, it has been assumed that the adding of the 25% contingency item to the net estimated bare costs in the 1917 estimates for the Queenston work would place them on a fair comparative basis with the corresponding contract prices on the Calumet-Sag and the Livingstone. As a matter of fact, it would be quite reasonable to assume that these contract prices carry a burden of 10% for contingencies and 25% for profit, over bare net cost. Such being the case, the net unit prices for Queenston might reasonably have been increased by 35% instead of 25% in order to make them fairly comparable with the contract prices above mentioned. If this had been done the 1917 unit prices for Queenston would have been 30% to 50% in excess of the contract figures for rock and correspondingly increased in the case of earth and plain concrete.

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Appendix 15 W. J. F. 9.

TABLE 1.

EARTH EXCAVATION - CALUMET-SAG.

| SECTION | CUBIC YARDS | BIDDER | UNIT PRICE |
|---------|-------------|----------|------------|
| 1 | 265,000 | Lowest | .24 |
| | | Average | .329 |
| | | Accepted | .248 |
| | 55,000 | Lowest | .30 |
| | | Average | .425 |
| | | Accepted | .35 |
| 2 | 221,000 | Lowest | .19 |
| | | Average | .264 |
| | | Accepted | .22 |
| 3 | 335,000 | Lowest | .27 |
| | | Average | .29 |
| | | Accepted | .29 |
| 4 | 780,000 | Lowest | .24 |
| | | Average | .291 |
| | | Accepted | .25 |
| 5 | 1,070,000 | Lowest | .24 |
| | | Average | .26 |
| | | Accepted | .24 |
| 7 and 8 | 2,350,000 | Lowest | .425 |
| | | Average | .499 |
| | | Accepted | .425 |
| 9 | 675,000 | Lowest | .285 |
| | | Average | .42 |
| | | Accepted | .2975 |
| 10 | 670,000 | Lowest | .31 |
| | | Average | .395 |
| | | Accepted | .328 |
| 11 | 750,000 | Lowest | .27 |
| | | Average | .355 |
| | | Accepted | .292 |
| 12 | 485,000 | Lowest | .235 |
| | | Average | .282 |
| | | Accepted | .255 |

... ..

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Appendix 13 10.

TABLE II.

ROCK EXCAVATION - CALUMET-SAG.

| SECTION | EXCAVATION
AND CHANNELING | BIDDER | UNIT PRICE | |
|---------|---------------------------------|----------|------------|---------------|
| | | | CHANNELING | NO CHANNELING |
| 1 | 31,500 c.y.
270,000 sq. ft. | Low | .89 | .65 |
| | | Average | 1.05 | .77 |
| | | Accepted | .89 | .65 |
| 2 | 351,000 c.y.
313,000 sq. ft. | Low | .83 | .65 |
| | | Average | .99 | .75 |
| | | Accepted | .83 | .65 |
| 3 | 220,000 c.y.
182,300 sq. ft. | Low | .90 | .69 |
| | | Average | .95 | .74 |
| | | Accepted | .90 | .69 |
| 4 | 121,000 c.y. | Low | - | .70 |
| | | Average | - | .79 |
| | | Accepted | - | .77 |
| 5 | 141,000 c.y. | Low | - | .70 |
| | | Average | - | .72 |
| | | Accepted | - | .70 |
| 7 and 8 | 15,000 c.y. | Low | - | .90 |
| | | Average | - | 2.15 |
| | | Accepted | - | 1.90 |
| 9 | 50,000 c.y. | Low | - | 1.15 |
| | | Average | - | 1.27 |
| | | Accepted | - | 1.25 |
| 10 | 300,000 c.y. | Low | - | .62 |
| | | Average | - | .68 |
| | | Accepted | - | .69 |
| 11 | 85,000 c.y. | Low | - | .65 |
| | | Average | - | .93 |
| | | Accepted | - | .65 |
| 12 | 125,000 c.y.
100,000 sq. ft. | Low | .85 | .65 |
| | | Average | .97 | .73 |
| | | Accepted | .93 | .70 |

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Appendix 13 W. J. F. 11.

TABLE III.

PLAIN CONCRETE - CALUMET-SAG.

| SECTION | CUBIC YARDS | BIDDER | UNIT PRICE |
|---------|-------------|----------------------------|-------------------------|
| 1 | 10,050 | Low
Average
Accepted | 5.84
6.93
6.54 |
| 2 | 3,200 | Low
Average
Accepted | 5.00
6.67
7.00 |
| 3 | 13,400 | Low
Average
Accepted | 4.95
5.48
4.95 |
| 5 | 375 | Low
Average
Accepted | 13.20
13.20
13.20 |
| 7 & 8 | 1,200 | Low
Average
Accepted | 9.53
11.76
10.95 |
| 9 | 1,100 | Low
Average
Accepted | 12.90
16.47
12.90 |
| 10 | 800 | Low
Average
Accepted | 7.75
11.64
9.44 |
| 12 | 950 | Low
Average
Accepted | 10.23
11.63
13.50 |

Page 111

August 18, 1944

Walter J. Francis & Company

| Invoice No. | Invoice Date | Invoice Amount | Invoice Balance |
|-------------|--------------|----------------|-----------------|
| 101 | 8-1-44 | 100.00 | 100.00 |
| 102 | 8-1-44 | 100.00 | 100.00 |
| 103 | 8-1-44 | 100.00 | 100.00 |
| 104 | 8-1-44 | 100.00 | 100.00 |
| 105 | 8-1-44 | 100.00 | 100.00 |
| 106 | 8-1-44 | 100.00 | 100.00 |
| 107 | 8-1-44 | 100.00 | 100.00 |
| 108 | 8-1-44 | 100.00 | 100.00 |
| 109 | 8-1-44 | 100.00 | 100.00 |
| 110 | 8-1-44 | 100.00 | 100.00 |
| 111 | 8-1-44 | 100.00 | 100.00 |
| 112 | 8-1-44 | 100.00 | 100.00 |
| 113 | 8-1-44 | 100.00 | 100.00 |
| 114 | 8-1-44 | 100.00 | 100.00 |
| 115 | 8-1-44 | 100.00 | 100.00 |
| 116 | 8-1-44 | 100.00 | 100.00 |
| 117 | 8-1-44 | 100.00 | 100.00 |
| 118 | 8-1-44 | 100.00 | 100.00 |
| 119 | 8-1-44 | 100.00 | 100.00 |
| 120 | 8-1-44 | 100.00 | 100.00 |
| 121 | 8-1-44 | 100.00 | 100.00 |
| 122 | 8-1-44 | 100.00 | 100.00 |
| 123 | 8-1-44 | 100.00 | 100.00 |
| 124 | 8-1-44 | 100.00 | 100.00 |
| 125 | 8-1-44 | 100.00 | 100.00 |
| 126 | 8-1-44 | 100.00 | 100.00 |
| 127 | 8-1-44 | 100.00 | 100.00 |
| 128 | 8-1-44 | 100.00 | 100.00 |
| 129 | 8-1-44 | 100.00 | 100.00 |
| 130 | 8-1-44 | 100.00 | 100.00 |
| 131 | 8-1-44 | 100.00 | 100.00 |
| 132 | 8-1-44 | 100.00 | 100.00 |
| 133 | 8-1-44 | 100.00 | 100.00 |
| 134 | 8-1-44 | 100.00 | 100.00 |
| 135 | 8-1-44 | 100.00 | 100.00 |
| 136 | 8-1-44 | 100.00 | 100.00 |
| 137 | 8-1-44 | 100.00 | 100.00 |
| 138 | 8-1-44 | 100.00 | 100.00 |
| 139 | 8-1-44 | 100.00 | 100.00 |
| 140 | 8-1-44 | 100.00 | 100.00 |
| 141 | 8-1-44 | 100.00 | 100.00 |
| 142 | 8-1-44 | 100.00 | 100.00 |
| 143 | 8-1-44 | 100.00 | 100.00 |
| 144 | 8-1-44 | 100.00 | 100.00 |
| 145 | 8-1-44 | 100.00 | 100.00 |
| 146 | 8-1-44 | 100.00 | 100.00 |
| 147 | 8-1-44 | 100.00 | 100.00 |
| 148 | 8-1-44 | 100.00 | 100.00 |
| 149 | 8-1-44 | 100.00 | 100.00 |
| 150 | 8-1-44 | 100.00 | 100.00 |

COPY

Appendix 13 12.

TABLE IV.

RIP-RAP - CALUMET-SAG.

| SECTION | SQUARE YARDS | BIDDER | UNIT PRICE
PER SQ. YD. | equiv. UNIT
PRICE PER
CUBIC YARD |
|---------|--------------|----------|---------------------------|--|
| 1 | 500 | Low | .75 | 1.13 |
| | | Average | 1.11 | 1.67 |
| | | Accepted | 1.00 | 1.50 |
| 3 | 5,000 | Low | .65 | .98 |
| | | Average | 1.05 | 1.58 |
| | | Accepted | 1.00 | 1.50 |
| 4 | 37,000 | Low | .50 | .75 |
| | | Average | .94 | 1.44 |
| | | Accepted | .50 | .75 |
| 5 | 59,000 | Low | .50 | .75 |
| | | Average | .75 | 1.13 |
| | | Accepted | 1.00 | 1.50 |
| 9 | 70,000 | Low | .75 | 1.13 |
| | | Average | 1.24 | 1.86 |
| | | Accepted | .75 | 1.13 |
| 10 | 72,000 | Low | .77 | 1.16 |
| | | Average | 1.05 | 1.58 |
| | | Accepted | .77 | 1.16 |
| 11 | 70,000 | Low | .65 | .98 |
| | | Average | .88 | 1.32 |
| | | Accepted | .65 | .98 |
| 12 | 25,000 | Low | .65 | .98 |
| | | Average | .80 | 1.20 |
| | | Accepted | .70 | 1.03 |

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...

...

| Year | ... | ... | ... | ... |
|------|-----|-----|-----|-----|
| 1911 | ... | ... | ... | ... |
| 1912 | ... | ... | ... | ... |
| 1913 | ... | ... | ... | ... |
| 1914 | ... | ... | ... | ... |
| 1915 | ... | ... | ... | ... |
| 1916 | ... | ... | ... | ... |
| 1917 | ... | ... | ... | ... |
| 1918 | ... | ... | ... | ... |
| 1919 | ... | ... | ... | ... |
| 1920 | ... | ... | ... | ... |
| 1921 | ... | ... | ... | ... |
| 1922 | ... | ... | ... | ... |
| 1923 | ... | ... | ... | ... |
| 1924 | ... | ... | ... | ... |
| 1925 | ... | ... | ... | ... |
| 1926 | ... | ... | ... | ... |
| 1927 | ... | ... | ... | ... |
| 1928 | ... | ... | ... | ... |
| 1929 | ... | ... | ... | ... |
| 1930 | ... | ... | ... | ... |
| 1931 | ... | ... | ... | ... |
| 1932 | ... | ... | ... | ... |
| 1933 | ... | ... | ... | ... |
| 1934 | ... | ... | ... | ... |
| 1935 | ... | ... | ... | ... |
| 1936 | ... | ... | ... | ... |
| 1937 | ... | ... | ... | ... |
| 1938 | ... | ... | ... | ... |
| 1939 | ... | ... | ... | ... |
| 1940 | ... | ... | ... | ... |
| 1941 | ... | ... | ... | ... |
| 1942 | ... | ... | ... | ... |
| 1943 | ... | ... | ... | ... |
| 1944 | ... | ... | ... | ... |
| 1945 | ... | ... | ... | ... |
| 1946 | ... | ... | ... | ... |
| 1947 | ... | ... | ... | ... |
| 1948 | ... | ... | ... | ... |
| 1949 | ... | ... | ... | ... |
| 1950 | ... | ... | ... | ... |
| 1951 | ... | ... | ... | ... |
| 1952 | ... | ... | ... | ... |
| 1953 | ... | ... | ... | ... |
| 1954 | ... | ... | ... | ... |
| 1955 | ... | ... | ... | ... |
| 1956 | ... | ... | ... | ... |
| 1957 | ... | ... | ... | ... |
| 1958 | ... | ... | ... | ... |
| 1959 | ... | ... | ... | ... |
| 1960 | ... | ... | ... | ... |
| 1961 | ... | ... | ... | ... |
| 1962 | ... | ... | ... | ... |
| 1963 | ... | ... | ... | ... |
| 1964 | ... | ... | ... | ... |
| 1965 | ... | ... | ... | ... |
| 1966 | ... | ... | ... | ... |
| 1967 | ... | ... | ... | ... |
| 1968 | ... | ... | ... | ... |
| 1969 | ... | ... | ... | ... |
| 1970 | ... | ... | ... | ... |
| 1971 | ... | ... | ... | ... |
| 1972 | ... | ... | ... | ... |
| 1973 | ... | ... | ... | ... |
| 1974 | ... | ... | ... | ... |
| 1975 | ... | ... | ... | ... |
| 1976 | ... | ... | ... | ... |
| 1977 | ... | ... | ... | ... |
| 1978 | ... | ... | ... | ... |
| 1979 | ... | ... | ... | ... |
| 1980 | ... | ... | ... | ... |
| 1981 | ... | ... | ... | ... |
| 1982 | ... | ... | ... | ... |
| 1983 | ... | ... | ... | ... |
| 1984 | ... | ... | ... | ... |
| 1985 | ... | ... | ... | ... |
| 1986 | ... | ... | ... | ... |
| 1987 | ... | ... | ... | ... |
| 1988 | ... | ... | ... | ... |
| 1989 | ... | ... | ... | ... |
| 1990 | ... | ... | ... | ... |
| 1991 | ... | ... | ... | ... |
| 1992 | ... | ... | ... | ... |
| 1993 | ... | ... | ... | ... |
| 1994 | ... | ... | ... | ... |
| 1995 | ... | ... | ... | ... |
| 1996 | ... | ... | ... | ... |
| 1997 | ... | ... | ... | ... |
| 1998 | ... | ... | ... | ... |
| 1999 | ... | ... | ... | ... |
| 2000 | ... | ... | ... | ... |
| 2001 | ... | ... | ... | ... |
| 2002 | ... | ... | ... | ... |
| 2003 | ... | ... | ... | ... |
| 2004 | ... | ... | ... | ... |
| 2005 | ... | ... | ... | ... |
| 2006 | ... | ... | ... | ... |
| 2007 | ... | ... | ... | ... |
| 2008 | ... | ... | ... | ... |
| 2009 | ... | ... | ... | ... |
| 2010 | ... | ... | ... | ... |
| 2011 | ... | ... | ... | ... |
| 2012 | ... | ... | ... | ... |
| 2013 | ... | ... | ... | ... |
| 2014 | ... | ... | ... | ... |
| 2015 | ... | ... | ... | ... |
| 2016 | ... | ... | ... | ... |
| 2017 | ... | ... | ... | ... |
| 2018 | ... | ... | ... | ... |
| 2019 | ... | ... | ... | ... |
| 2020 | ... | ... | ... | ... |
| 2021 | ... | ... | ... | ... |
| 2022 | ... | ... | ... | ... |
| 2023 | ... | ... | ... | ... |
| 2024 | ... | ... | ... | ... |
| 2025 | ... | ... | ... | ... |
| 2026 | ... | ... | ... | ... |
| 2027 | ... | ... | ... | ... |
| 2028 | ... | ... | ... | ... |
| 2029 | ... | ... | ... | ... |
| 2030 | ... | ... | ... | ... |

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1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

| DATE | | DESCRIPTION | | AMOUNT | | BALANCE | |
|------------|-------------|-------------|---------|------------|-------------|---------|---------|
| DATE | DESCRIPTION | AMOUNT | BALANCE | DATE | DESCRIPTION | AMOUNT | BALANCE |
| 1941.01.01 | TO BALANCE | 100.00 | 100.00 | 1941.01.01 | TO BALANCE | 100.00 | 100.00 |
| 1941.01.05 | BY CHECK | 25.00 | 75.00 | 1941.01.05 | BY CHECK | 25.00 | 75.00 |
| 1941.01.10 | TO DEPOSIT | 50.00 | 125.00 | 1941.01.10 | TO DEPOSIT | 50.00 | 125.00 |
| 1941.01.15 | BY CHECK | 10.00 | 115.00 | 1941.01.15 | BY CHECK | 10.00 | 115.00 |
| 1941.01.20 | TO DEPOSIT | 30.00 | 145.00 | 1941.01.20 | TO DEPOSIT | 30.00 | 145.00 |
| 1941.01.25 | BY CHECK | 15.00 | 130.00 | 1941.01.25 | BY CHECK | 15.00 | 130.00 |
| 1941.01.30 | TO DEPOSIT | 40.00 | 170.00 | 1941.01.30 | TO DEPOSIT | 40.00 | 170.00 |
| 1941.02.05 | BY CHECK | 20.00 | 150.00 | 1941.02.05 | BY CHECK | 20.00 | 150.00 |
| 1941.02.10 | TO DEPOSIT | 35.00 | 185.00 | 1941.02.10 | TO DEPOSIT | 35.00 | 185.00 |
| 1941.02.15 | BY CHECK | 12.00 | 173.00 | 1941.02.15 | BY CHECK | 12.00 | 173.00 |
| 1941.02.20 | TO DEPOSIT | 28.00 | 201.00 | 1941.02.20 | TO DEPOSIT | 28.00 | 201.00 |
| 1941.02.25 | BY CHECK | 18.00 | 183.00 | 1941.02.25 | BY CHECK | 18.00 | 183.00 |
| 1941.02.28 | TO DEPOSIT | 32.00 | 215.00 | 1941.02.28 | TO DEPOSIT | 32.00 | 215.00 |
| 1941.03.05 | BY CHECK | 22.00 | 193.00 | 1941.03.05 | BY CHECK | 22.00 | 193.00 |
| 1941.03.10 | TO DEPOSIT | 38.00 | 231.00 | 1941.03.10 | TO DEPOSIT | 38.00 | 231.00 |
| 1941.03.15 | BY CHECK | 14.00 | 217.00 | 1941.03.15 | BY CHECK | 14.00 | 217.00 |
| 1941.03.20 | TO DEPOSIT | 26.00 | 243.00 | 1941.03.20 | TO DEPOSIT | 26.00 | 243.00 |
| 1941.03.25 | BY CHECK | 16.00 | 227.00 | 1941.03.25 | BY CHECK | 16.00 | 227.00 |
| 1941.03.30 | TO DEPOSIT | 34.00 | 261.00 | 1941.03.30 | TO DEPOSIT | 34.00 | 261.00 |
| 1941.04.05 | BY CHECK | 24.00 | 237.00 | 1941.04.05 | BY CHECK | 24.00 | 237.00 |
| 1941.04.10 | TO DEPOSIT | 36.00 | 273.00 | 1941.04.10 | TO DEPOSIT | 36.00 | 273.00 |
| 1941.04.15 | BY CHECK | 18.00 | 255.00 | 1941.04.15 | BY CHECK | 18.00 | 255.00 |
| 1941.04.20 | TO DEPOSIT | 30.00 | 285.00 | 1941.04.20 | TO DEPOSIT | 30.00 | 285.00 |
| 1941.04.25 | BY CHECK | 20.00 | 265.00 | 1941.04.25 | BY CHECK | 20.00 | 265.00 |
| 1941.04.30 | TO DEPOSIT | 32.00 | 297.00 | 1941.04.30 | TO DEPOSIT | 32.00 | 297.00 |
| 1941.05.05 | BY CHECK | 22.00 | 275.00 | 1941.05.05 | BY CHECK | 22.00 | 275.00 |
| 1941.05.10 | TO DEPOSIT | 38.00 | 313.00 | 1941.05.10 | TO DEPOSIT | 38.00 | 313.00 |
| 1941.05.15 | BY CHECK | 14.00 | 299.00 | 1941.05.15 | BY CHECK | 14.00 | 299.00 |
| 1941.05.20 | TO DEPOSIT | 26.00 | 325.00 | 1941.05.20 | TO DEPOSIT | 26.00 | 325.00 |
| 1941.05.25 | BY CHECK | 16.00 | 309.00 | 1941.05.25 | BY CHECK | 16.00 | 309.00 |
| 1941.05.30 | TO DEPOSIT | 34.00 | 343.00 | 1941.05.30 | TO DEPOSIT | 34.00 | 343.00 |
| 1941.06.05 | BY CHECK | 24.00 | 319.00 | 1941.06.05 | BY CHECK | 24.00 | 319.00 |
| 1941.06.10 | TO DEPOSIT | 36.00 | 355.00 | 1941.06.10 | TO DEPOSIT | 36.00 | 355.00 |
| 1941.06.15 | BY CHECK | 18.00 | 337.00 | 1941.06.15 | BY CHECK | 18.00 | 337.00 |
| 1941.06.20 | TO DEPOSIT | 30.00 | 367.00 | 1941.06.20 | TO DEPOSIT | 30.00 | 367.00 |
| 1941.06.25 | BY CHECK | 20.00 | 347.00 | 1941.06.25 | BY CHECK | 20.00 | 347.00 |
| 1941.06.30 | TO DEPOSIT | 32.00 | 379.00 | 1941.06.30 | TO DEPOSIT | 32.00 | 379.00 |
| 1941.07.05 | BY CHECK | 22.00 | 357.00 | 1941.07.05 | BY CHECK | 22.00 | 357.00 |
| 1941.07.10 | TO DEPOSIT | 38.00 | 395.00 | 1941.07.10 | TO DEPOSIT | 38.00 | 395.00 |

Table No. 5.

CALUMET-SAG

SUMMARY OF UNIT AND TOTAL CONTRACT COSTS OF

| SECTION | EARTH | | | ROCK | | |
|---------------|-----------------------|------------|------------------------|------------------------|----------------|----------------------------|
| | CUBIC YARDS | UNIT COST | TOTAL COST | CUBIC YARDS | UNIT COST | TOTAL COST |
| 1 | 265,000)
55,000) | .24
.30 | 63,600.00
16,500.00 | 315,000
315,000 | .89)
.65) | 280,350.00
204,750.00 |
| 2 | 221,000
— | .19
— | 41,990.00
— | 351,000
351,000 | .83)
.65) | 290,628.00
228,150.00 |
| 3 | 335,000
— | .27
— | 90,450.00
— | 220,000
220,000 | .90)
.69) | 197,340.00
151,800.00 |
| 4 | 780,000 | .24 | 187,200.00 | 121,000 | .70 | 84,700.00 |
| 5 | 1,070,000 | .24 | 256,800.00 | 141,000 | .70 | 98,700.00 |
| 7 & 8 | 2,350,000 | .425 | 998,750.00 | 15,000 | .90 | 13,500.00 |
| 9 | 875,000 | .285 | 249,375.00 | 50,000 | 1.15 | 57,500.00 |
| 10 | 670,000 | .31 | 207,700.00 | 300,000 | .62 | 186,000.00 |
| 11 | 750,000 | .27 | 202,500.00 | 85,000 | .65 | 55,250.00 |
| 12 | 485,000
— | .235
— | 113,975.00
— | 125,000
125,000 | .85)
.65) | 106,250.00
81,250.00 |
| Average Price | | .309 | | | .674
.865 | |
| Total Cost | | | 2,428,640.00 | | | 1,161,600.00
874,568.00 |
| Total Yds. | 7,856,000 | | | 1,723,000
1,011,000 | | |

Appendix 13 13.

1.
LIST OF LOWEST UNIT PRICE BID FOR EACH SECTION

| PLAIN CONCRETE | | | RIP-RAP | | |
|----------------|-----------|------------|-------------|-----------|------------|
| CUBIC YARDS | UNIT COST | TOTAL COST | CUBIC YARDS | UNIT COST | TOTAL COST |
| 10,050 | 5.34 | 53,667.00 | 333 | 1.13 | 375.00 |
| - | - | - | - | - | - |
| 3,200 | 5.00 | 16,000.00 | - | - | - |
| - | - | - | - | - | - |
| 13,400 | 4.95 | 66,330.00 | 3,333 | .98 | 3,250.00 |
| - | - | - | - | - | - |
| - | - | - | 24,667 | .75 | 18,500.00 |
| 375 | 13.20 | 4,950.00 | 46,000 | .75 | 34,500.00 |
| 1,200 | 8.53 | 10,236.00 | - | - | - |
| 1,100 | 12.90 | 14,190.00 | 46,667 | 1.13 | 52,500.00 |
| 800 | 7.75 | 6,200.00 | 48,000 | 1.16 | 55,400.00 |
| - | - | - | 46,667 | .98 | 45,500.00 |
| 950 | 10.23 | 9,718.00 | 16,667 | .98 | 16,250.00 |
| - | - | - | - | - | - |
| 5.63 | | | .974 | | |
| 181,291.00 | | | 226,275.00 | | |
| 51,075 | | | 232,334 | | |

2. Rock prices in Sections 1, 2, 3 and 12 are shown with and without channeling.
The costs for rip-rap are shown on an equivalent cubic yard basis.

[illegible]

[Faint, illegible text from bleed-through]

1. The first of these is the fact that the Commission has not yet received any information from the Government of the United States regarding the activities of the Committee for the Liberation of the Americas (CLA) in the United States.

Table No. 6.

CALCULATED

AVERAGE OF ALL TENDERS

| SECTION | EARTH | | | ROCK | | |
|---------------|-------------|-----------|--------------|-------------|-----------|--------------|
| | CUBIC YARDS | UNIT COST | TOTAL COST | CUBIC YARDS | UNIT COST | TOTAL COST |
| 1 | 265,000 | .329 | 87,185.00 | 315,000 | 1.046 | 329,490.00 |
| | 55,000 | .425 | 23,375.00 | 315,000 | .771 | 242,865.00 |
| 2 | 221,000 | .264 | 58,344.00 | 351,000 | .985 | 345,735.00 |
| | - | - | - | 351,000 | .755 | 263,601.00 |
| 3 | 335,000 | .290 | 97,150.00 | 220,000 | .947 | 208,340.00 |
| | - | - | - | 220,000 | .740 | 162,800.00 |
| 4 | 780,000 | .291 | 226,980.00 | 121,000 | .792 | 95,832.00 |
| 5 | 1,070,000 | .260 | 278,200.00 | 141,000 | .720 | 101,520.00 |
| 7 & 8 | 2,350,000 | .499 | 1,172,650.00 | 15,000 | 2.150 | 32,250.00 |
| 9 | 875,000 | .420 | 367,500.00 | 50,000 | 1.268 | 63,400.00 |
| 10 | 670,000 | .395 | 264,650.00 | 300,000 | .660 | 198,000.00 |
| 11 | 750,000 | .355 | 266,250.00 | 85,000 | .927 | 78,795.00 |
| 12 | 465,000 | .282 | 131,770.00 | 125,000 | .966 | 120,750.00 |
| | - | - | - | 125,000 | .731 | 91,375.00 |
| Average Price | | .379 | | | .778 | |
| | | | | | .904 | |
| Total Cost | | | 2,979,054.00 | | | 1,340,438.00 |
| | | | | | | 914,315.00 |
| Total Yardage | 7,856,000 | | | 1,723,000 | | |
| | | | | 1,011,000 | | |

Appendix 13 14.

ALL
PRINCIPAL ITEMS FOR EACH SECTION

| PLAIN CONCRETE | | | RIP-RAP | | |
|----------------|-----------|------------|------------|-----------|------------|
| CU YARDS | UNIT COST | TOTAL COST | CU YARDS | UNIT COST | TOTAL COST |
| 10,060 | 6.93 | 69,345.00 | 333 | 1.67 | 557.00 |
| - | - | - | - | - | - |
| 8,200 | 6.67 | 21,344.00 | - | - | - |
| - | - | - | - | - | - |
| 13,430 | 5.48 | 73,432.00 | 3,333 | 1.575 | 5,250.00 |
| - | - | - | - | - | - |
| - | - | - | 24,667 | 1.44 | 35,520.00 |
| 375 | 13.20 | 4,950.00 | 46,000 | 1.13 | 51,780.00 |
| 1,200 | 11.76 | 14,112.00 | - | - | - |
| 1,100 | 16.47 | 18,117.00 | 46,667 | 1.86 | 86,800.00 |
| 800 | 11.64 | 9,312.00 | 46,000 | 1.66 | 75,796.00 |
| - | - | - | 46,667 | 1.32 | 61,600.00 |
| 950 | 11.63 | 11,048.00 | 16,667 | 1.20 | 20,000.00 |
| - | - | - | - | - | - |
| 7.13 | | | 1.452 | | |
| 221,660.00 | | | 337,275.00 | | |
| 31,075 | | | 232,334 | | |

| 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Table No. 7.

CALUMET-S

LOWEST TENDERS ON ENTIRE CONTRACTS. PRICE

| SECTION | EARTH | | | ROCK | | |
|---------|-------------|-----------|--------------|-------------|-----------|--------------|
| | CUBIC YARDS | UNIT COST | TOTAL COST | CUBIC YARDS | UNIT COST | TOTAL COST |
| 1 | 265,000 | .245 | 64,925.00 | 315,000 | .890 | 280,350.00 |
| | 55,000 | .350 | 19,250.00 | 315,000 | .650 | 204,750.00 |
| 2 | 221,000 | .220 | 48,620.00 | 351,000 | .928 | 290,628.00 |
| | - | - | - | 351,000 | .650 | 228,150.00 |
| 3 | 335,000 | .290 | 97,150.00 | 220,000 | .897 | 197,340.00 |
| | - | - | - | 220,000 | .690 | 151,800.00 |
| 4 | 780,000 | .250 | 195,000.00 | 121,000 | .770 | 93,170.00 |
| 5 | 1,070,000 | .240 | 256,800.00 | 141,000 | .700 | 98,700.00 |
| 7 & 8 | 2,350,000 | .425 | 1,065,039.00 | 15,000 | 1.900 | 28,500.00 |
| 9 | 875,000 | .2875 | 251,562.00 | 50,000 | 1.250 | 62,500.00 |
| 10 | 670,000 | .325 | 218,420.00 | 300,000 | .690 | 207,000.00 |
| 11 | 750,000 | .292 | 219,000.00 | 85,000 | .650 | 55,250.00 |
| 12 | 485,000 | .255 | 123,675.00 | 125,000 | .928 | 116,000.00 |
| | - | - | - | 125,000 | .700 | 87,500.00 |
| Average | | | | | | |
| Price | | .326 | | | .706 | |
| | | | | | .875 | |
| Total | | | | | | |
| Cost | | | 2,559,441.00 | | | 1,217,320.00 |
| | | | | | | 884,318.00 |
| Total | | | | | | |
| Yardage | 7,056,000 | | | 1,723,000 | | |
| | | | | 1,011,000 | | |

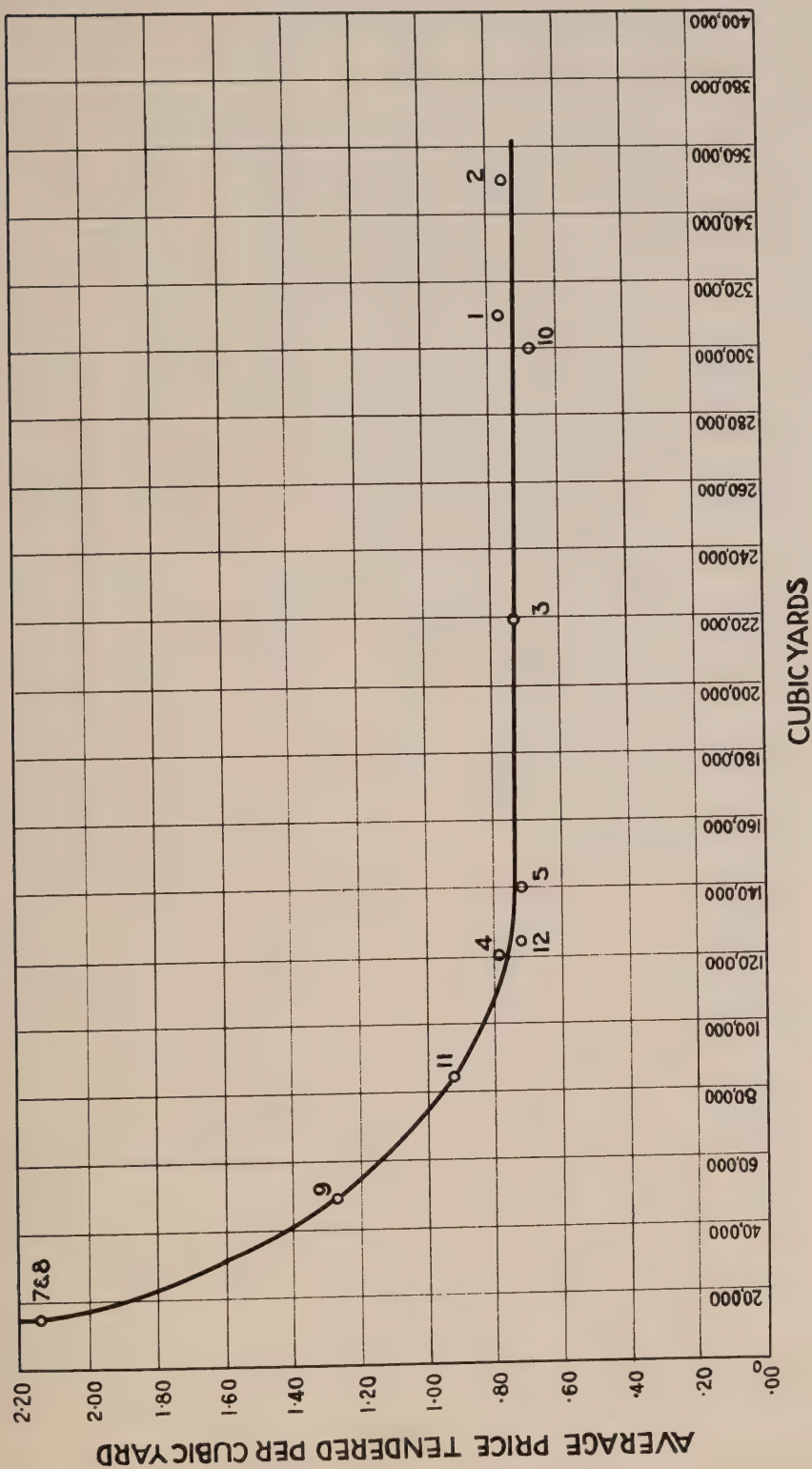
Appendix 15 15.

ACCEPTED TENDERS FOR EACH SECTION

| PLAIN CONCRETE | | | RIP-RAP | | |
|----------------|-----------|------------|-------------|-----------|------------|
| CUBIC YARDS | UNIT COST | TOTAL COST | CUBIC YARDS | UNIT COST | TOTAL COST |
| 10,050 | 6.54 | 65,727.00 | 533 | 1.50 | 500.00 |
| - | - | - | - | - | - |
| 3,200 | 7.00 | 22,400.00 | - | - | - |
| - | - | - | - | - | - |
| 13,400 | 4.95 | 66,330.00 | 5,333 | 1.50 | 5,000.00 |
| - | - | - | - | - | - |
| - | - | - | 44,667 | .75 | 18,500.00 |
| 375 | 13.20 | 4,950.00 | 46,000 | 1.50 | 69,000.00 |
| 1,300 | 10.95 | 13,140.00 | - | - | - |
| 1,100 | 12.90 | 14,190.00 | 46,667 | 1.13 | 52,500.00 |
| 800 | 9.44 | 7,552.00 | 48,000 | 1.16 | 55,400.00 |
| - | - | - | 46,667 | .98 | 45,500.00 |
| 950 | 13.50 | 12,825.00 | 16,667 | 1.05 | 17,500.00 |
| - | - | - | - | - | - |
| | 6.66 | | | 1.136 | |
| | | 207,114.00 | | | 263,900.00 |
| 51,075 | | | 232,334 | | |

NOTE: Rock prices in Sections 1, 2, 3 and 12 are shown with and without channelling.

The rip-rap total shows the equivalent cost on a yardage basis.



APPENDIX 13-CHART A
RELATION BETWEEN QUANTITIES
AND UNIT PRICES
ROCK EXCAVATION-CALUMET SAG CANAL
(AVERAGE OF BIDS ON ROCK IN EACH CONTRACT)

APPENDIX 14.EARTH COSTS IN 1917, AND EARTH AND ROCK
COSTS IN 1917, 1918 AND 1919

From an examination of the charts it will be seen that the Commission actually took out earth excavation in 1917 and 1918 at less than estimated cost, and had the material excavated been normally dry, and had shovels Nos. 1 and 2 been delivered promptly, the average cost of earth excavation would have closely approached the estimate, even though it was abnormally wet.

As soon as Nos. 1 and 2 shovels got in commission the effect was at once demonstrated, and at this juncture it should be considered that the estimated price per cubic yard was that for which the large shovels were to be the excavating units for the greater part of the yardage. It will also be fairly well established that even had the man-hour rate remained at the maximum figure of 1917, and had the large shovels been delivered promptly and worked continuously, the price of 30¢ to 35¢ per yard would have been the actual cost of earth, even up to the end of 1918.

The price of 62.2¢ appearing for 1919 was to a great extent due to the high man-hour rate and inefficiency of labor, but at the time the cost began to rise abnormally, in April 1919, it was confidently expected that a pronounced drop in labor and material costs was overdue and was expected at any time. Furthermore, at this time there remained 80% of the earth excavation to be done, together with the whole of the canal rock and concrete, and the abnormal rise in cost would only be applicable to the small amount of work done up to that time, and would easily be absorbed in the great bulk of the work to be done under anticipated normal conditions.

APPENDIX No 14

UNIT COSTS

EARTH EXCAVATION

1917, 1918, 1919

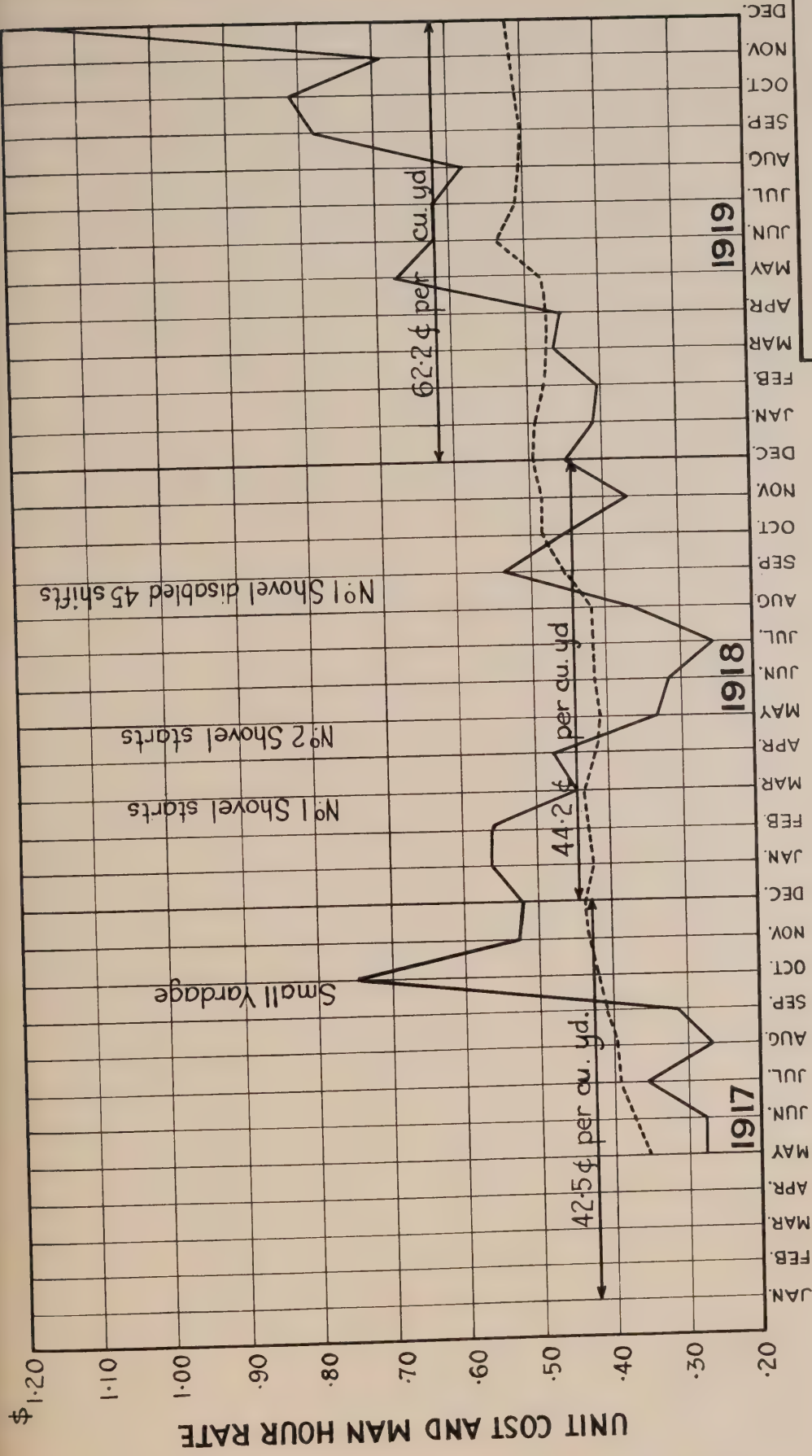
JULY 1921

卷二 五言古詩 五言律詩 五言絕句

[illegible]

up to the end of 1918.

[illegible]

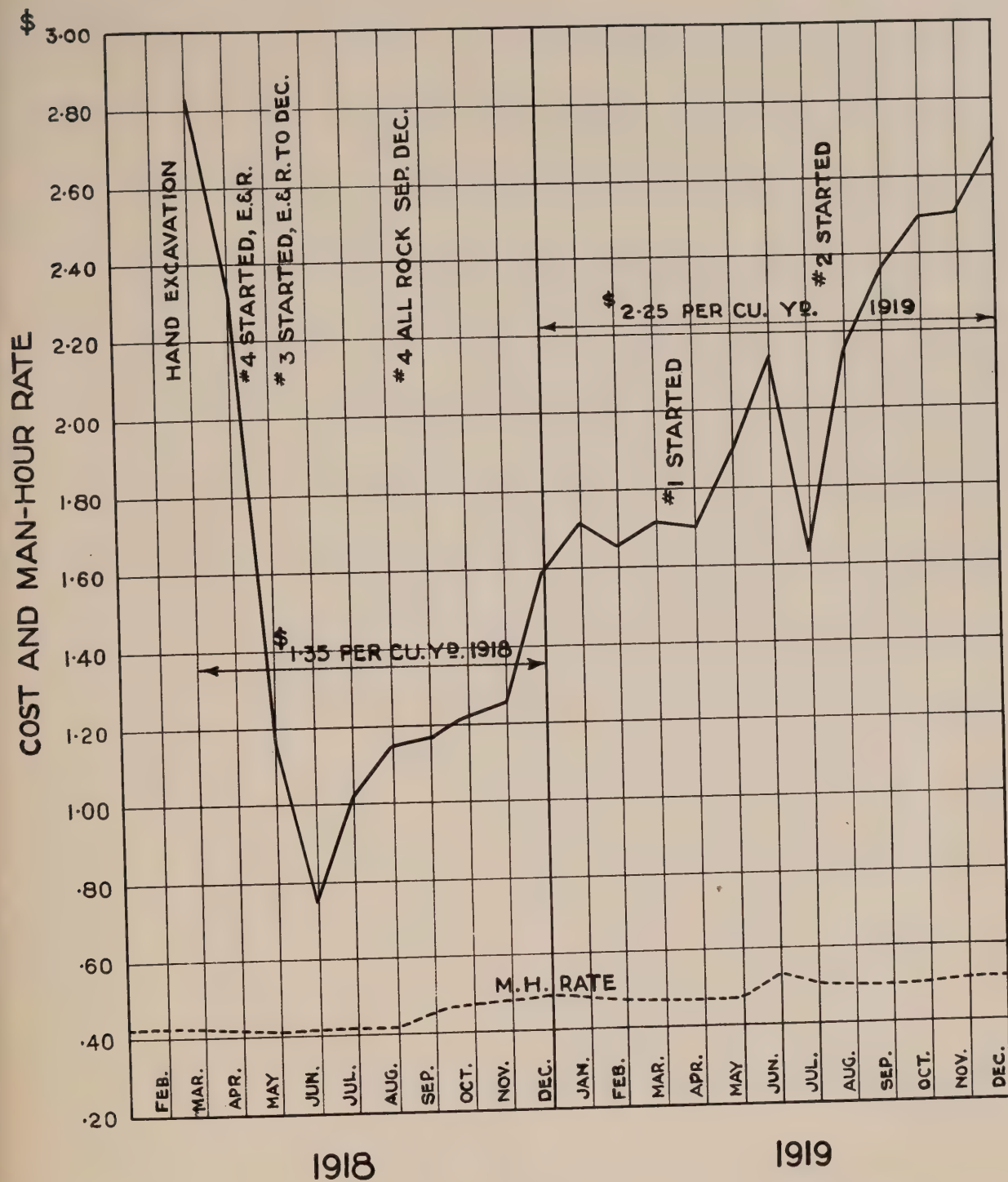


NOTE EFFECT OF LARGE SHOVELS BEGINNING IN MARCH AND MAY, 1918, ALTHOUGH MAN HOUR RATE HAS INCREASED.

APPENDIX No 14 UNIT COSTS EARTH EXCAVATION 1917, 1918, 1919. July, 1923.

UNIT COSTS

MAN HOUR RATE



APPENDIX 14
UNIT COST,
ROCK EXCAVATION
1918 AND 1919

July, 1923.

Appendix 15

APPENDIX 15.

Comparison of direct working force and cost in rock before single shifting in 1921 with a day of equal rock production after single shifting. Also comparison of single shift shovel production in 1921 as compared with day shift on double shift basis tabulation.

The following tabulation shows a listing of the direct labor component of a cubic yard of rock for the period 1921, listed monthly, and takes in all the rock excavated in that period, during which time the double shift was discontinued and the single shift started.

| <u>DOUBLE 10 HR. SHIFT</u> | | | <u>SINGLE 10 HR. DAY SHIFT</u> | | |
|----------------------------|---------------------|-----------------|--------------------------------|------------------------|-----------------|
| <u>1921</u> | <u>DIRECT LABOR</u> | <u>QUANTITY</u> | <u>1921</u> | <u>DIRECT LABOR</u> | <u>QUANTITY</u> |
| Jan. | .615 | 92,108 | Aug. | .280 | 192,180 |
| Feb. | .424 | 164,711 | Sept. | .242 | 179,477 |
| Mar. | .279 | 231,016 | Oct. | .215 | 220,426 |
| Apr. | .352 | 247,460 | Nov. | .210 | 167,599 |
| May | .413 | 207,491 | Dec. | Nothing of importance. | |
| June | .373 | 296,662 | | | |
| July | .431 | 276,101 | | | |
| Cost per Cu. Yd. | .374 | 1,565,549 | Cost per Cu. Yd. | .238 | 749,652 |

The above Direct Labor figures show a very pronounced change in favor of the single shift construction procedure, and covers prices ranging over 2,000,000 cubic yards of rock excavation taken out by our combined rock excavating shovels, during the year 1921.

The reduction in favor of single shift shows 37% on Direct Labor. However, this reduction in Direct Labor would apply to as great an extent on materials

1991

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The following information shows a listing of the direct costs component of a single year of work for the period 1961, 1962, 1963, and 1964. The work estimated in that period, starting with the amount which was the

| 1901 | 1902 | 1903 | 1904 | 1905 | 1906 | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1901 | 1902 | 1903 | 1904 | 1905 | 1906 | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 |

[illegible]

The above information is being furnished to you for your information and is not to be used for any other purpose.

valuing above all, during the year 1884.

This reduction in direct labor costs may be as great as twenty per cent.

Appendix 15 2.

and plant, in that the reasons for the reduction in labor would curtail the necessity for material and plant, this especially being so in the case of the lighting systems employed for night service only, and in the application of repairs, which are more economical during the quiet period of fourteen (14) hours in every twenty-four (24), by reason of the fact that a small gang can work steadily and maintain the plant in fourteen (14) hours out of the twenty-four (24) much more efficiently than the large gang necessary for rush repair work in the four (4) hours between the two ten-hour shifts of the twenty-four (24).

Also see comments from the following letter:

Mr. Bradley,

COPY

September 14th, 1921.

Mr. Acres.

Production Records in Earth, Rock and Concrete on the Double Shift Method; as Compared with the same Period Single Shift, and applying the Labor Reduction recently placed into effect.

Dear Sir:

Average yardage of the past double shift rush period compared with our single shift present period, shows improvement in yardage results on our excavating plants in favor of the single shift (covering a month and a half test) of 26%. 1825-2 In earth - 3,400

Our actual labor reductions of 15% coupled with the 26% efficiency increase, by day work only, has shown an actual effect of 37% reduction of labor costs for earth and rock, comparing July and August.

This improved efficiency on single shift was realized without any change whatever in the personell of the supervisory organization or in the working procedure.

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Production Records in North. Book and Records on the
Larkin Gift Record; as compared with the same period 1910
and 1911, and the same period 1912 and 1913.

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for earth and rock, comparing daily and August.

Approved in the presence of the undersigned and the undersigned
The undersigned

APPENDIX 16.

ANALYSIS OF THE UNIT COST OF EARTH AND ROCK
EXCAVATION IN CANAL, FOREBAY AND SCREEN-HOUSE,
UTILIZING TWO 225-B BUCYRUS AND TWO 103-C
BUCYRUS ELECTRIC SHOVELS.

NO. 1

725 cubic yards per day measurement.

In the following, the investigation will be considered under two divisions; namely, (a) a comparison of actual unit costs with those which would have obtained by using the shovels at their originally estimated capacities, and (b) a comparison of the actual unit costs with those which would have obtained by using the shovels at their actual maximum capacities. These comparisons will be made under the following conditions:

COPY

1. - That consideration only will be given to the four shovels as originally purchased; namely, two 225-B and two 103-C Bucyrus electric shovels.

2. - The shovels to be used only in canal, forebay and screen house as originally planned.

3. - First, that the shovels work at their originally estimated capacities which are as follows:

| | | | |
|----------------|---|-------|---------------------------------|
| 225-B in earth | - | 5,000 | cubic yards per day of 10 hours |
| 225-B in rock | - | 3,000 | " " " " " " |
| 103-C in earth | - | 3,500 | " " " " " " |
| 103-C in rock | - | 2,000 | " " " " " " |

and second, that the shovels be utilized at their actual maximum capacities which are as follows:

No. 1 in earth on April 10th, 1919 had a ten hour output of 5,180 cubic yards bank measurement.

No. 2 in earth on March 4th, 1919 had a ten hour output of 4,060 cubic yards bank measurement.

Appendix 16 2.

No. 3 in earth on September 28th, 1920 had a ten hour output of 2,950 cubic yards bank measurement.

No. 4 in earth on January 7th, 1921 had a ten hour output of 2,567 cubic yards bank measurement.

No. 1 in rock on March 22nd, 1920 had a ten hour output of 1,792 cubic yards bank measurement.

No. 2 in rock on June 25th, 1921 had a ten hour output of 2,000 cubic yards bank measurement.

No. 3 in rock on April 30th, 1919 had a ten hour output of 1,865 cubic yards bank measurement.

No. 4 in rock on January 6th, 1919 had a ten hour output of 1,782 cubic yards bank measurement.

This gives a mean for shovels Nos. 1 and 2 in earth of 4,620 cubic yards per day of ten hours, and Nos. 3 and 4 in earth, 2,759 cubic yards per day of ten hours. The mean of Nos. 1 and 2 in rock was 1,895 cubic yards per day of ten hours, and Nos. 3 and 4 in rock, 1,824 cubic yards per day of ten hours.

4. That the shovels work day shift only for 310 days per year and ten hours per day.

5. That the 103-C type in rock is limited to the removal of the first 10 ft. over the canal, forebay and screen-house.

6. That the final actual quantities of excavation be used, which are as follows:

| | <u>EARTH</u> | <u>ROCK</u> |
|--------------------|----------------|----------------|
| Canal | 9,651,557 c.y. | 3,840,378 c.y. |
| Forebay | 49,082 " | 473,690 " |
| Screen-house | 1,826 " | 43,470 " |
| | 9,702,165 c.y. | 4,357,438 c.y. |

7. The rock for the 103-C type will be approximately 311,000 cubic yards, leaving 3,546,438 cubic yards of rock to be removed by the 225-B type.

Appendix 14

1. 100 cubic yards bank measurement.
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| | | |
|--------------|----------------|----------------|
| Canal | 9,221,227 c.y. | 9,221,227 c.y. |
| Forebay | 42,002 " | 42,002 " |
| Access-house | 1,222 " | 1,222 " |
| | 9,702,100 c.y. | 9,702,100 c.y. |

1. 100 cubic yards bank measurement.
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Appendix 16 B.

3. That the date for the beginning of this excavation will be taken as April 1st, 1918, when delivery of the first large plant order was completed.

and shovels Nos. 21, 22, 23, 24, 25, which was 5,000,000 cubic yards at 50¢ each

and shovels Nos. 26, 27, 28, 29, 30, which was 5,000,000 cubic yards at 50¢ each

UNIT COSTS WITH SHOVELS AT ORIGINALLY ESTIMATED CAPACITY.

| | <u>EARTH</u> | <u>ROCK</u> |
|---|------------------|-------------|
| 2-103-C in rock for 203 days at 2,000 cubic yards per day each | - | 811,000 |
| 2-103-C in earth for 338 days at 3,500 cubic yards per day each | 2,716,000 | - |
| 2-103-C in earth for 411 days at 3,500 cubic yards per day each | 2,877,000 | - |
| 2-225-B in rock for 591 days at 3,000 cubic yards per day each | - | 3,546,438 |
| 2-225-B in earth for 411 days at 5,000 cubic yards per day each | <u>4,109,165</u> | |
| | 9,702,165 | 4,357,438 |

Thus, the total time for these shovels is 591+411 days = 1,002 days, and 1,002 days from April 1st, 1918 will give about July 1st, 1921 as the date of completion of the excavation.

The unit costs of rock and earth excavation taken out by these shovels if working at originally estimated capacities are obtained by utilizing the actual total costs accumulated against the shovels in question, against these estimated capacities. The actual unit cost is also stated.

1. SHOVELS IN EARTH EXCAVATION.

(1) - 225-B TYPE:

Under actual conditions, No. 1 worked 418 ten hour shifts, and No. 2 worked

Appendix 16.....4.

867 ten hour shifts, or a total of 1,285 ten hour shifts for this type of shovel, in earth. The total actual cost of excavation and disposal for these two shovels was \$1,468,990.15, which was 2,255,050 cubic yards at 64.2 cents per cubic yard. The cost per ten hour shift = \$1,213.19 which at estimated capacity of 5,000 cubic yards per shift = 24.3 cents per cubic yard.

(2) - 103-C TYPE:

Under actual conditions, No. 3 worked 1,317 ten hour shifts, and No. 4 worked 523 ten hour shifts, or a total of 1,840 ten hour shifts for this type of shovel, in earth. The total actual cost of excavation and disposal for these two shovels was \$1,655,134.89, which is 1,422,772 cubic yards at \$1.17 per cubic yard. The cost per ten hour shift = \$900.00, which at the originally estimated capacity of 3,500 cubic yards per ten hours = 25.7 cents per cubic yard.

FOR ALL FOUR SHOVELS:

The amount of earth assigned to the two 225-B shovels in this estimated procedure is 4,109,165 cubic yards, which at 24.3 cents = \$998,527.10, and for the two 103-C shovels is 5,693,000 cubic yards, which at 25.7 cents = \$1,457,401.00, a total of \$2,435,928.10, or a general average of 2,702,165 cubic yards of earth at 25.1 cents per cubic yard.

2. SHOVELS IN EARTH EXCAVATION.(1) - 225-B TYPE:

Under actual conditions No. 1 worked 1,418 ten hour shifts, and No. 2 worked

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Appendix 16 5.

945 ten hour shifts, or a total of 2,363 ten hour shifts for this type of shovel, in rock. The total actual cost of excavation and disposal for these two shovels was \$8,062,083.95 which is 2,377,749 cubic yards at \$3.39 per cubic yard. The cost per ten hour shift = \$3,411.80, which at the originally estimated capacity of 3,000 cubic yards per ten hours = \$1.1373 per cubic yard.

(2) - 103-C TYPE:

Under actual conditions, No. 3 worked 371 ten hour shifts and No. 4 worked 661 ten hour shifts, or a total of 1,032 ten hour shifts for this type of shovel, in rock. The total cost of excavation and disposal of these two shovels was \$1,594,645.45 which is 593,376 cubic yards at \$3.16 per cubic yard. The cost per ten hour shift = \$1,545.20 which at the originally estimated capacity of 2,000 cubic yards per shift = 77.26 cents per cubic yard.

FOR ALL FOUR SHOVELS:

The amount of rock assigned to the two 225-B shovels in this originally estimated procedure is 3,546,438 cubic yards at \$1.1373 = \$4,159,971.77, and for the two 103-C shovels is 811,000 cubic yards, which at 77.26 cents = \$626,578.60, a total of \$4,786,550.37, or a general average of 4,357,438 cubic yards of rock at \$1.099 per cubic yard.

1980, 1981, 1982, 1983, and 1984).

1. The first part of the report is a general statement of the purpose and scope of the study. It states that the purpose is to determine the effect of the new tax law on the income of individuals and that the scope is limited to the year 1964.

[illegible]

1. The first part of the report is a general description of the project and its objectives. It includes a brief history of the project and a statement of the problem to be solved. This part is followed by a description of the methods used in the study and a summary of the results. The second part of the report is a detailed description of the results of the study. It includes a discussion of the findings and a conclusion. The third part of the report is a bibliography of the references used in the study. The fourth part of the report is an appendix containing the raw data and the calculations used in the study. The fifth part of the report is a list of the authors and their affiliations. The sixth part of the report is a list of the names of the people who helped in the study. The seventh part of the report is a list of the names of the people who reviewed the report. The eighth part of the report is a list of the names of the people who helped in the study. The ninth part of the report is a list of the names of the people who reviewed the report. The tenth part of the report is a list of the names of the people who helped in the study.

1. The amount of cash received from the sale of the property is \$100,000.00. The amount of cash received from the sale of the property is \$100,000.00. The amount of cash received from the sale of the property is \$100,000.00.

Appendix 16 6.

UNIT COSTS WITH SHOVELS AT ACTUAL MAXIMUM CAPACITY.

| | <u>EARTH</u> | <u>ROCK</u> |
|---|--------------|-------------|
| 2-193-C shovels in rock for 222 days at 1,824 cubic yards per day each | - | 811,000 |
| 2-225-B shovels in rock for 935 days at 1,896 cubic yards per day each | - | 3,546,438 |
| 2-193-C shovels in earth for 713 days at 2,759 cubic yards per day each | 3,924,334 | - |
| 2-193-C shovels in earth for 391 days at 2,759 cubic yards per day each | 2,157,538 | - |
| 2-225-B shovels in earth for 391 days at 4,620 cubic yards per day each | 3,610,293 | - |
| | 9,702,165 | 4,357,438 |

COPY

Thus, the total time for all shovels will be 935+391 days = 1,326 days,

which from April 1st, 1918 is equal to four seasons of 310 days of ten hours

each + 86 days, giving an approximate date for the completion of the excavation

of July 10th, 1922.

also 1,326 days is 8,556 shifts

Utilizing the total cost chargeable to shovels working in excavation against the actual maximum capacities, the following indicates the unit costs resulting:

1. SHOVELS IN EARTH EXCAVATION.(1) - 225-B TYPE:

Under actual conditions, No. 1 worked 418 ten hour shifts, and No. 2 worked 867 ten hour shifts, or a total of 1,285 ten hour shifts for this type of shovel, in earth. The total cost of excavation and disposal for these two

August 12, 1914

THE NATIONAL TRADING COMPANY, LIMITED

DEAR SIR:

2-12-14 - Invoice for 1000 lbs. of 1,000 lbs. each
2-12-14 - Invoice for 1000 lbs. of 1,000 lbs. each
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2-12-14 - Invoice for 1000 lbs. of 1,000 lbs. each

COPY

Enclosed for your information are the following invoices for the goods ordered by you on August 1st, 1914. The total amount of the invoices is \$1,000.00.

Very respectfully,
WALTER J. FRANK & COMPANY

WALTER J. FRANK & COMPANY

WALTER J. FRANK & COMPANY

Yours faithfully,
WALTER J. FRANK & COMPANY

Appendix 16.....7.

shovels was \$1,468,900.15, which is 2,255,050 cubic yards at 64.2 cents per cubic yard. The cost per shift = \$1,213.10, which at the actual maximum capacity of 4,620 cubic yards per ten hours = 26.3 cents per cubic yard.

(2) - 103-C TYPE:

Under actual conditions, No. 3 worked 1,317 ten hour shifts, and No. 4 worked 523 ten hour shifts, or a total of 1,840 ten hour shifts for this type of shovel, in earth. The total cost of excavation and disposal for these two shovels was \$1,655,134.69, which is 1,422,772 cubic yards at \$1.17 per cubic yard. The cost per ten hour shift = \$900.00, which at actual maximum capacity of 2,750 cubic yards per ten hour shift = 32.6 cents per cubic yard.

(3) - FOR ALL FOUR SHOVELS:

The amount of earth assigned to the two 225-B shovels under this estimated procedure is 3,610,293 cubic yards, which at 26.3 cents = \$949,507.06, and for the two 103-C is 6,091,872 cubic yards which at 32.6 cents = \$1,985,950.27, a total of \$2,935,457.77, or a general average of 9,702,165 cubic yards of earth at 30.26 cents per cubic yard.

2. SHOVELS IN ROCK EXCAVATION.

(1) - 225-B TYPE:

Under actual conditions, No. 1 worked 1,418 ten hour shifts, and No. 2 worked 945 ten hour shifts, or a total of 2,363 ten hour shifts for this type of shovel in rock. The total cost of excavation and disposal for these two shovels was \$8,062,083.95 which is 2,377,749 cubic yards at \$3.39 per cubic

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1. The first part of the report, which is the most important, is the description of the situation in the country. This part is divided into two main sections: the first section describes the situation in the country as a whole, and the second section describes the situation in the various regions of the country. The first section is divided into three parts: the first part describes the situation in the country as a whole, the second part describes the situation in the various regions of the country, and the third part describes the situation in the various districts of the country. The second section is divided into two parts: the first part describes the situation in the various regions of the country, and the second part describes the situation in the various districts of the country.

[illegible]

The amount of work required in the two classes under this category
 is approximately 10,000 man-hours, with an estimated cost of \$1,000,000.
 The two classes are 10,000 man-hours and 10,000 man-hours.
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 The total cost of the two classes is \$1,000,000.
 The total cost of the two classes is \$1,000,000.

Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group (n = 10) and the experimental group (n = 10). The control group received a placebo (P) and the experimental group received a 10% solution of the active ingredient (A). The subjects were divided into two groups: the control group (n = 10) and the experimental group (n = 10). The control group received a placebo (P) and the experimental group received a 10% solution of the active ingredient (A). The subjects were divided into two groups: the control group (n = 10) and the experimental group (n = 10). The control group received a placebo (P) and the experimental group received a 10% solution of the active ingredient (A).

[illegible]

Appendix 16 8.

yard. The cost per shift = \$3,411.80 which at the actual maximum capacity of 1,896 cubic yards per ten hour shift is \$1.80 per cubic yard.

(2) - 103-C TYPE:

Under actual conditions, No. 3 worked 371 ten hour shifts, and No. 4 worked 661 ten hour shifts, or a total of 1,032 ten hour shifts for this type of shovel, in rock. The total cost of excavation and disposal of these two shovels was \$1,594,645.45 which is 505,376 cubic yards at \$3.16 per cubic yard. The cost per ten hour shift = \$1,545.20, which at the actual maximum capacity of 1,824 cubic yards per ten hours = 90.2 cents per cubic yard.

(3) - FOR ALL FOUR SHOVELS:

COPY

The amount of rock excavation assigned to the two 225-B shovels in this estimated procedure is 3,546,438 cubic yards, which at \$1.80 = \$6,383,588.46, and for the two 103-C is 811,000 cubic yards, which at 90.4 cents = \$731,522.00, or 4,357,438 cubic yards at \$1.63 per cubic yard = \$7,115,110.40, or a general average of 4,357,438 cubic yards of rock at \$1.63 per cubic yard.

Chlorophyll

1. The main body of the report is divided into two parts: the first part is the main body of the report and the second part is the conclusion.

Under similar conditions, the amount of the loss will be the same.

COPY

[illegible]

Appendix 15 9.

SUMMARY

| SHOVELS | ACTUAL
UNIT COST | | (A)
UNIT COST AT
EST. CAPACITY | | (B)
UNIT COST AT
ACTUAL MAX-
IMUM CAPACITY | |
|-----------------------|---------------------|-------|--------------------------------------|--------|---|-------|
| | | | | | | |
| | EARTH | ROCK | EARTH | ROCK | EARTH | ROCK |
| 225-B Nos.
1 and 2 | .642 | - | .243 | - | .263 | - |
| | - | 3.390 | - | 1.137 | - | 1.800 |
| 103-C Nos.
3 and 4 | 1.170 | - | .257 | - | .326 | - |
| | - | 3.160 | - | .7726 | - | .902 |
| All shovels | .849 | - | .251 | - | .3026 | - |
| | - | 3.350 | - | 1.0990 | - | 1.630 |

COPY

It therefore appears from the above that the unit costs with originally estimated capacities are actually less than the original 1917 estimates. These unit costs are obtained by using all actual costs chargeable to the shovels, working in rock and earth excavation, against the originally estimated capacities of the shovels, and show that had anticipated shovel capacities been realized and maintained, the actual cost of excavation would have been less than that estimated in 1917, even though handicapped by the inflated prices of labor and material. Furthermore, the date of completion under day shift work only, with the original plant, would have been about July 1st, 1921, which would have been sufficiently early to provide for the admission of water into the canal by September 1st, 1921, and would have completed the 6,500 second foot canal well within the three year limit originally estimated but not scheduled.

Also, the unit costs utilizing the shovels at the actual maximum capacities, are obtained in a similar way, that is, by including all possible charges

1880-1881

1 2 3 4 5 6 7

[illegible]

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31. The following table shows the number of people who were killed or injured in traffic accidents in the United States in 1998.

1947 - 1948: The first two years of the project were spent on the collection of data and the establishment of the project.

with many are involved in water pollution and some time

10-10-68

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Self made and well over 100 years experience in the Pacific NW, construction law

Revised 12/11/11. JRM:al

REMARKS: The above information was obtained from the file of the Bureau of the Census, Washington, D.C., and is being furnished to you for your information.

The original film, which was made about 1907, shows some

RECEIVED

Der Autor dankt seinem F&B mit Unterstützung durch Walter Kow, CHY, für die Unterstützung.

Within the three year limit originally estimated for the project.

1. WILLIAMSON-OWEN CONDENSED AMINE WAS AN ALIPHATIC AND POSSIBLE STRONG TYPE WAS USED.

and obtained in a similar way, thus for instance the following

Appendix 16..... 10.

against earth and rock excavation by these shovels, against the actual maximum capacities of the shovels. It will be seen that the actual production of one of these 225-B shovels on April 10th, 1919 actually exceeded the estimated capacity by 180 cubic yards in ten hours, even though rip-rap was placed to hold the banks, indicating that had the excavation been normal, the average output in earth could have been made equal to that estimated, working day shift only, especially by utilizing the leeway given by working 310 days per year instead of 250 days as estimated.

These unit values also indicate that the earth excavation would have been less than that estimated and the rock about 35% higher; that is, by using estimated 1917 prices of 33- $\frac{1}{2}$ cents per cubic yard for earth and \$1.21 $\frac{1}{2}$ per cubic yard for rock.

These four shovels would have completed the excavation for canal, forebay and screen-house by July 1st, 1922 working day shift only. In equity, it should be stated that the actual total costs used in the above computations included night shift work, and the basis upon which the foregoing analysis is made assumes that the greater night costs are absorbed in the equivalent day shift costs. This would seem to indicate that had it been feasible to secure the actual day costs, the unit prices resulting would have been even lower than those above set forth.

Approximate 18,000,000

against which and your committee by these efforts, against the original intention
expectation of the committee. It will be seen that the original intention of the
of these 180-2 efforts in April 1961, this committee intended the original
opportunity of 180 efforts in the future, even though they are placed in
half the future, indicating that the committee had been working for some time
that in such efforts have been made equal to that originally working for half
only, especially by utilizing the money given by working the 180 efforts
intention of 180 efforts as indicated.

These efforts would also indicate that the committee intended to work
180 efforts that indicated that the committee intended to work 180 efforts
which 180 efforts of 180 efforts that the committee intended to work 180 efforts
from the year.

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and committee by 180 efforts that the committee intended to work 180 efforts
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which 180 efforts that the committee intended to work 180 efforts that the committee
that the committee intended to work 180 efforts that the committee intended to work
this would seem to indicate that the committee intended to work 180 efforts
180 efforts that the committee intended to work 180 efforts that the committee
forth.

EARTH EXCAVATIONTABLE OF MAXIMUM SHOVEL CAPACITIES

10 hour shift.

| SHOVEL NO. 1 | | SHOVEL NO. 2 | | SHOVEL NO. 3 | | SHOVEL NO. 4 | |
|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|
| Month
and
Year | Actual
C.Y.
Max. Cap. | Month
and
Year | Actual
C.Y.
Max. Cap. | Month
and
Year | Actual
C.Y.
Max. Cap. | Month
and
Year | Actual
C.Y.
Max. Cap. |
| Apr. 1, 1919 | 3400 | Jan. 27, 1919 | 3392 | Oct. 24, 1919 | 2465 | - | - |
| " 2, 1919 | 3400 | " 28, 1919 | 3328 | Sept. 2, 1920 | 2890 | Nov. 3, 1920 | 1972 |
| " 3, 1919 | 3370 | " 29, 1919 | 3312 | " 16, 1920 | 2628 | " 5, 1920 | 2023 |
| " 5, 1919 | 3944 | Feb. 3, 1919 | 3584 | " 17, 1920 | 2944 | " 9, 1920 | 1955 |
| " 5, 1919 | 3644 | " 12, 1919 | 3600 | " 28, 1920 | <u>3030</u> | " 9, 1920 | 2176 |
| " 6, 1919 | 3842 | " 13, 1919 | 3520 | " 29, 1920 | 2932 | Dec. 16, 1920 | 1920 |
| " 7, 1919 | 4165 | " 18, 1919 | 3618 | | | " 31, 1920 | 2246 |
| " 7, 1919 | 3570 | " 20, 1919 | 3600 | | | Jan. 3, 1921 | 2240 |
| " 9, 1919 | 4216 | Mar. 4, 1919 | <u>3898</u> | | | " 7, 1921 | <u>2272</u> |
| " 10, 1919 | <u>4930</u> | Apr. 4, 1919 | 3705 | | | | |
| " 10, 1919 | 3570 | Aug. 5, 1919 | 3857 | | | | |
| " 11, 1919 | 4199 | | | | | | |
| " 11, 1919 | 3740 | | | | | | |
| " 12, 1919 | 4313 | | | | | | |
| " 12, 1919 | 4080 | | | | | | |

COPY

Average - 4100-(corrected) 3730-(corrected) 2722-(corrected) 2390-(corrected)

Shovel No. 1 - Maximum (car measurement) April 10th, 1919 .. 4,930 c.y. per
Corrected to bank measurement 5,180 shift

Shovel No. 2 - Maximum (car measurement) May 4th, 1919 3,898 " "
Corrected to bank measurement 4,060 " "

Shovel No. 3 - Maximum (car measurement) September
23th, 1920 3,030 " "
Corrected to bank measurement 2,950 " "

Shovel No. 4 - Maximum (car measurement) January 7th, 1921 . 2,272 " "
Corrected to bank measurement 2,567 " "

STATEMENT OF ACCOUNT

IN CASH

| DEBIT | | CREDIT | | BALANCE | | DATE | |
|--------|-------------|--------|-------------|---------|----------|--------|------|
| AMOUNT | DESCRIPTION | AMOUNT | DESCRIPTION | AMOUNT | DATE | AMOUNT | DATE |
| 100.00 | TO BALANCE | | | 100.00 | 1/1/21 | | |
| | | 50.00 | BY CHECK | 50.00 | 1/15/21 | | |
| | | 25.00 | BY CHECK | 25.00 | 2/1/21 | | |
| | | 10.00 | BY CHECK | 15.00 | 2/15/21 | | |
| | | 5.00 | BY CHECK | 10.00 | 3/1/21 | | |
| | | 2.50 | BY CHECK | 7.50 | 3/15/21 | | |
| | | 1.25 | BY CHECK | 6.25 | 4/1/21 | | |
| | | 0.62 | BY CHECK | 5.63 | 4/15/21 | | |
| | | 0.31 | BY CHECK | 5.32 | 5/1/21 | | |
| | | 0.16 | BY CHECK | 5.16 | 5/15/21 | | |
| | | 0.08 | BY CHECK | 5.08 | 6/1/21 | | |
| | | 0.04 | BY CHECK | 5.04 | 6/15/21 | | |
| | | 0.02 | BY CHECK | 5.02 | 7/1/21 | | |
| | | 0.01 | BY CHECK | 5.01 | 7/15/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 8/1/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 8/15/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 9/1/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 9/15/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 10/1/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 10/15/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 11/1/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 11/15/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 12/1/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 12/15/21 | | |
| | | 0.00 | BY CHECK | 5.00 | 1/1/22 | | |

COPY

STATEMENT OF ACCOUNT - (continued)

Showing No. 1 - Balance (for measurement) 100.00 1/1/21

Showing No. 2 - Balance (for measurement) 5.00 1/1/21

Showing No. 3 - Balance (for measurement) 5.00 1/1/21

Showing No. 4 - Balance (for measurement) 5.00 1/1/21

ROCK EXCAVATIONTABLE OF MAXIMUM SHOVEL CAPACITIES

10 hour shift.

| SHOVEL NO. 1 | | SHOVEL NO. 2 | | SHOVEL NO. 3 | | SHOVEL NO. 4 | |
|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|
| Month
and
Year | Actual
C.Y.
Max. Cap. | Month
and
Year | Actual
C.Y.
Max. Cap. | Month
and
Year | Actual
C.Y.
Max. Cap. | Month
and
Year | Actual
C.Y.
Max. Cap. |
| May 2, 1920 | 1700 | Apr. 14, 1921 | 1687 | Apr. 25, 1919 | 1366 | Nov. 14, 1918 | 1404 |
| " 19, " | 1760 | " 21, " | 1644 | " 30, " | 1582 | Jan. 3, 1919 | 1260 |
| " 22, " | 1630 | " 26, " | 1736 | May 6, " | 1282 | " 4, " | 1568 |
| Oct. 27, " | 1826 | June 2, " | 1794 | | | " 6, " | 1680 |
| Mar. 29, 1921 | 1683 | " 5, " | 1840 | | | | |
| | | " 24, " | 1817 | | | | |
| | | " 26, " | 1874 | | | | |

Average - 1724-(corrected) 1835-(corrected) 1650-(corrected) 1567-(corrected)

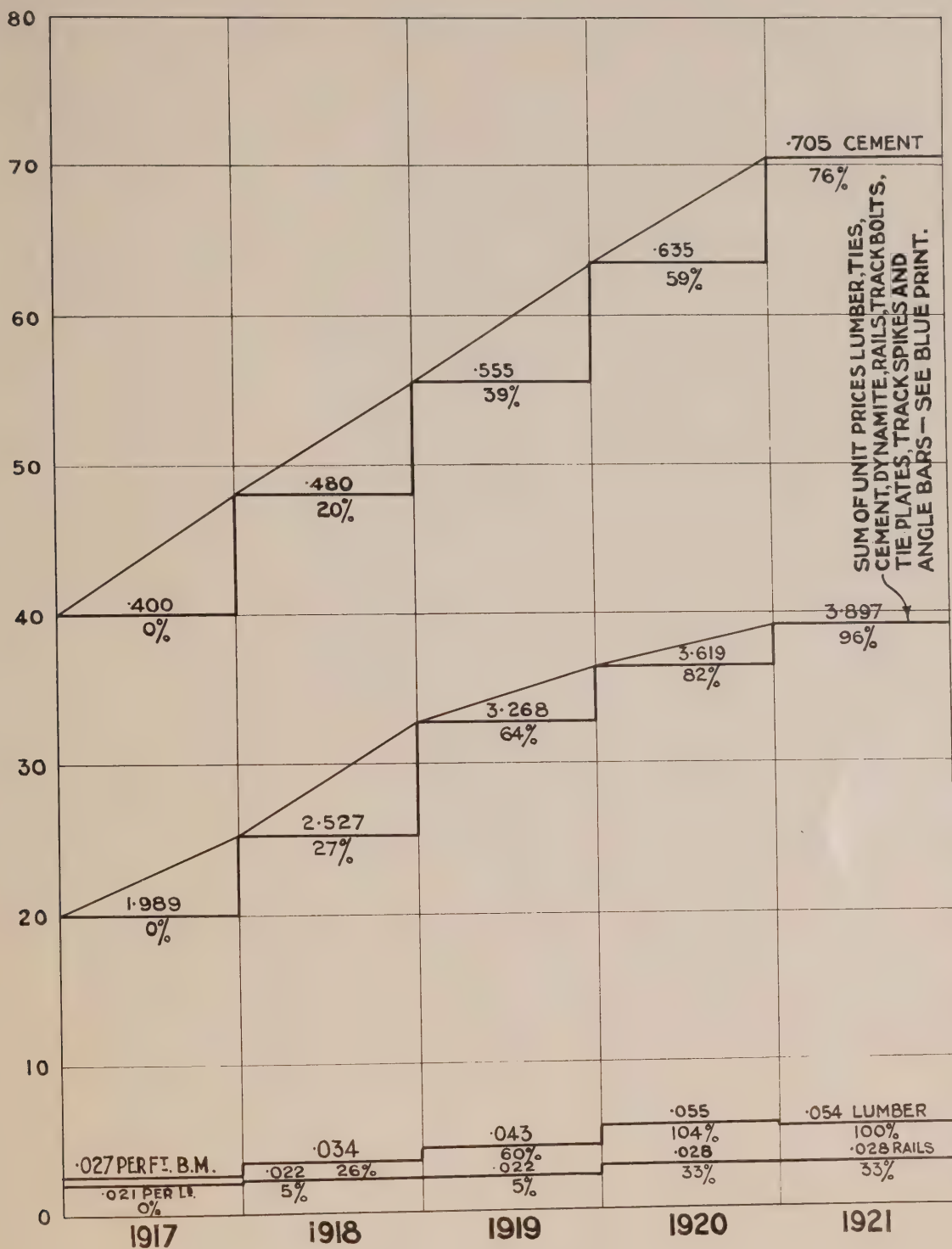
Shovel No. 1 - Maximum (car measurement) May 2nd, 1920 .. 1,630 c.y. per
Corrected to bank measurement 1,792 shift

Shovel No. 2 - Maximum (car measurement) June 26th, 1921. 1,674 " "
Corrected to bank measurement 2,000 " "

Shovel No. 3 - Maximum (car measurement) April 30th, 1919. 1,582
Corrected to bank measurement 1,860 " "

Shovel No. 4 - Maximum (car measurement) January 6th,
1919 1,680 " "
Corrected to bank measurement 1,782 " "

APPENDIX D
TO ACCOMPANY BLUE PRINT OF
UNIT AND TOTAL COST OF INCIDENT
CONSTRUCTION MATERIALS FOR YEARS
1917-1921 INCLUSIVE



APPENDIX 17
TO ACCOMPANY BLUE PRINT OF
UNIT AND TOTAL COST OF IMPORTANT
CONSTRUCTION MATERIALS FOR YEARS
1917-1921 INCLUSIVE

July, 1923.

ANSWERS TO QUESTIONS ITEMIZED IN MR. BOWER'S LETTER
TO MR. POPE OF JUNE 14TH, 1923.

Question 1: On what information were unit prices used in the original estimate and referred to by Mr. Gaby in his report to the Chairman of the Commission under date of January 11th, 1917, based?

Answer: The unit prices in the estimate referred to were derived by the ordinary process of engineering experience, analogy, and precedent. Two outstanding examples of the data which had some bearing on establishment of these prices were the unit prices obtaining on the Calumet-Sag contracts on the Chicago drainage canal in 1916 and the rock excavation in the Livingston Channel of the Detroit River.

Full data in connection with these above works is set forth in Mr. Goodwin's report on excavation methods which is already in the hands of the Commissioners, and a more extended analysis of these same contracts and prices is contained in Mr. Acres' answers to the contractors' evidence.

(See also transcription of Mr. Acres' recent evidence before the Commission).

Question 2: By what percentage was it anticipated that the use of extra large shovels and electrically driven equipment would reduce the cost of rock and earth excavation?

1939, THAT WILL BE THAT, OK OF

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84

and at the same time, the fact that the

[Faint, illegible text]

of the Tenth River.

Commission).

2000

On the 10th of June 1964, the following was received from the
Director of the Department of the Interior, Ottawa, Ontario:

Answer:

These figures are set forth in detail in Appendix No. 7 of Mr. Acres' report of December 25th, 1917. (See also the statement of Contractor Heyworth in Mr. Goodwin's report on excavation methods on the Calumet-Sag Canal).

Question 3:

In submitting a report to the Chairman of your Commission under date of January 11th, 1917, comparing the plant proposed by your Commission with that proposed by Messrs. Baldry, Yerborg & Hutchinson, Mr. Gaby stated that to do the work in a three-year period you contemplated the following equipment:

COPY

| | |
|------------------------------|-----|
| Drag Dives and Shovels | 5 |
| Steam Locomotives | 6 |
| Electric Locomotives | 10 |
| Dump Cars | 200 |

Was this actually the amount of equipment that you had figured on. Taking into consideration the actual output of each unit of plant installed do you consider the work as originally contemplated could have been done within the three year period with this amount of equipment?

Answer:

The above specified items did constitute the actual estimated amount of equipment figured on, more particularly in respect of the shovels and dump cars.

This matter is covered fully in Mr. Acres' answers to the contractors' evidence.

The answer to the second part of this question is "Yes". It

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—state and local (see also the center)

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THE UNIVERSITY OF CHICAGO

in submitting a report to the Chairman of your Committee

[illegible]

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..... 1940

For the following questions, write the letter of the correct answer in the space provided.

These two investigations are the subject matter of two parts of the book.

Since the beginning of the year, the number of cases has been increasing.

Very truly yours,
 [Signature]

Training Log

the actual estimated

and to request of the

1900

This article is covered fully in the Journal, volume 18, no. 1.

[illegible]

© 1997 by Cambridge University Press. Printed in the United Kingdom. This is a hardback book.

must be remembered, of course, that the capacity of the canal at that time was 6500 cubic feet per second.

would be insufficient to do the work

Question 4: On the same basis so referred to in the above questions Mr. Gaby stated that the total number of men required to operate the plant as referred to above was 191 men, as compared with 660 men proposed under the Hutchinson organization. On the same basis, as above, do you think the work was possible of accomplishment within the three-year period with this number of men to operate the equipment?

COPY

Answer: Yes.

Question 5: Explain in a general way what steps were taken to provide the plant necessary to carry on the work, and how soon were orders placed after authorization was received to proceed.

Answer: This particular phase of the situation has been explained as fully as it would seem possible to explain it in Mr. Francis' reports, more particularly his Chronological Charts, page H-98, referring to excavating units, and pages H-95 to H-98, inclusive.

The first large order for plant was placed the day that the purchase of same was authorized by the Commission. This matter is further referred to in Mr. Acres' report on the contractors' evidence.

100-443887-1000

On the same basis as referred to in the above questions the fact stated that the fact stated is not limited to the fact as referred to above and the fact as referred to above and proposed under the American organization. On the same basis as stated, do you think the work was possible at any time.

Y903

1. The first step is to identify the problem or goal. This involves understanding the current situation and what needs to be achieved.

Further reference is made to the fact that the defendant, who was arrested on the 12th of March, 1934, at the residence of his mother, 1234 North 1st Street, St. Paul, Minnesota, was found in possession of a large quantity of stolen goods, including a large quantity of clothing, a large quantity of jewelry, and a large quantity of other personal property. The defendant was found in possession of these goods at the residence of his mother, 1234 North 1st Street, St. Paul, Minnesota, on the 12th of March, 1934.

Question 6: How soon after you had commenced preliminary operations did you realize that the original amount of equipment estimated upon would be insufficient to do the work?

Answer: When plans were changed to enlarge the capacity of the canal previous to the Spring of 1918.

Question 7: Were complete plans made before actual operation commenced for service railways, disposal area trestles, and other services and were these services entirely completed at commencement of operations or were they added to from time to time as the work progressed?

Answer: Insofar as the original 6500 second foot canal was concerned, complete plans for service railways and other auxiliary services were made before operation commenced, and these plans were enlarged from time to time as conditions changed. There were no plans for the disposal area trestles, because no plans were needed. Procedure in this regard was limited to the issue from the field office of sketches of standard trestle for the use of the trestle foreman. These services were necessarily added to from time to time as the work progressed, because the scope of the work changed from time to time. This has been fully explained since the beginning of the inquiry.

Question 3: The new plan was designed to enlarge the capacity of the canal and provide for the additional amount of water to be admitted and would be installed in the new way.

Answer: The plan was designed to enlarge the capacity of the canal previous to the spring of 1916.

Question 4: The new plan was designed to enlarge the capacity of the canal and provide for the additional amount of water to be admitted and would be installed in the new way.

COPY

10-21

Answer: The new plan was designed to enlarge the capacity of the canal and provide for the additional amount of water to be admitted and would be installed in the new way.

10-21

Question 8: Explain in a general way the reasons governing your decision to commence operations at Bowman's Gulley and the method in which the work was proceeded with from this point. In answering this question it is not necessary to give details of yardage and so forth, as these are all contained in Mr. Francis' report. What is required is a general explanation of the reasons leading to the placing of plant and so forth.

Answer: This matter was referred to Mr. Acres' recent evidence before the Commission, and is referred to again at considerable length in his answers to the contractors' evidence.

Question 9: In January 1917, as already pointed out, Mr. Gaby stated that only five shovels and drag lines would be required on the work. It is understood that by December of 1917 you had 5 electric shovels and 2 steam shovels on the work, that by June 14, 1919, you had 2 more electric and 1 steam shovel added, and that during 1920, 3 steam shovels and 1 steam ditcher additional were in operation. From this it will be noted that even after your report known as Estimate No. 2 bearing date January 10th, 1918, in which you state that sufficient equipment was then on the work to complete operations for a 10,000 second foot canal by October, 1921, with equipment mentioned in your report as being then already purchased, the record shows that in July of that same year electric shovels Nos. 8 and 9 were purchased. Following this, shovels were again purchased in May and October, 1919,

(C-8)

Enclosure 2

Details in a general way the various questions
to various questions in the field and the various
the work was completed with this paper. In answering this
question it is not necessary to give details of practice and so forth,
as these are all contained in Mr. Ross's report. What is required
is a general explanation of the reasons leading to the present
plan and so forth.

Enclosure 1

COPY

Enclosure 3

In January 1914, as already stated, Mr. Ross stated that
only five questions had been asked in regard to the report. It
is understood that of January 1915 he had 6 questions
and 8 more questions on the way. Some of them are as follows:
Some of these are 1 - How many schools were there in 1914? 2 - How
many and 3 - How many children were in the schools? From this
it will be seen that these three questions are the only ones
asked since January 1914. In view of this you will understand
that it is not necessary to make any further questions for a long
time. These three questions, 1914, with various questions in 1915
report on which they already furnished the answer when they
July at that time were already stated in Mr. Ross's report.
Following this, various other questions in 1915 and January 1916.

and July, August and November 1920. Why was the purchase of equipment spread over such a long period and why was it necessary to increase it so soon after the statement contained in your report above referred to?

Answer: The reason why it was necessary to increase the original amount of plant so soon after December, 1917, was the decision to increase the canal to 10,000 cubic feet per second capacity. When the statement was made in connection with Estimate No. 2 that sufficient equipment for the construction of a 10,000 second foot canal was already purchased, it was doubtless due to the fact that in 1917 a recommendation was made for the purchase of two more electric shovels in order to make good the original schedule with the added quantities involved in the 10,000 second foot enlargement. This recommendation was probably in mind when the statement was made that sufficient plant was available for the purpose intended. In fact, it was decided that this plant be not purchased at the time, in view of the disturbed state of the market, and it was not until the following Spring that the order was placed.

Question 10: When estimate in the amount of approximately \$25,000,000. dated January 23, 1919, was made, giving a canal capacity of 15,000 cubic feet per second, an installed capacity of 300,000 h.p. and an ultimate capacity of 500,000 h.p. did this estimate take care of all the necessary increases in the size of the canal, the lining of the canal

(10-4)

and that during the period 1917, 1918 and 1919 the company
equipment should have been a large part of the total
to interest it in such other the statement contained in your
last above referred to.

The reason why it was necessary to include the original
statement of assets as filed with the Securities and Exchange
Commission for the year 1917, was the fact
that the statement was made in connection with the sale of
certain equipment for the year 1917, and it was
found that the statement was not correct due to the fact that
in 1917 a considerable sum was paid for the purchase of new
equipment which is stated in the original statement as
the same equipment included in the 1917 statement that equipment.
This statement was prepared in such a way that the statement was
that equipment was included in the statement, and
that it was decided that this statement was purchased at the time,
in view of the statement of the assets, and it was decided
the following system that the order was placed.

These assets in the amount of approximately \$100,000.00, dated
January 15, 1917, was made, giving a total value of \$100,000.00
and was found to be correct, and it was decided to include
this equipment at \$100,000.00 in the statement of assets for the year
1917, and it was decided to include this equipment in the statement of assets

and other works, excepting the final intake design for the works as at present constructed?

Answer:

No such estimate as the one above specified was ever made by the engineers of the Commission. This particular matter was explained at great length in Mr. Gaby's and Mr. Acres' evidence before Mr. Rowell, and has also been further amplified and explained in Mr. Acres' answer to the contractors' evidence.

Question 11:

In making the estimate above referred to, it is understood that same was based upon Estimate No. 2 which in turn was based on the unit prices used in the original estimate submitted to the Commission by Mr. Gaby in January 1917. Had not unit costs of work increased materially above the cost as estimated in 1917, and if so why were the actual costs not used in preparing this estimate?

Answer:

The same answer applies in this case as to Question 10 above. The reason for not increasing the unit price is fully explained in the documents above mentioned, and in the curves and exhibits which accompany them.

Question 12:

Describe in a general way the main items of expense involved in the cost of unwatering, which it is understood amounted to approximately \$1,800,000.

Answer:

The conditions and reasons which led to the expenditure of the

and allow us to distinguish the three different cases:

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It is noted that the following items are not an effective copy of

the engineers of the Government. This particular was not an error.

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...and the ...

[illegible]

THESE ARE THE ONLY

1909

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The results of the first two experiments are shown in Figure 1.

[Faint, illegible text at the bottom of the page]

1890

• 300, 058, 18 Владимирова

above specified amount of money in unwatering, are fully detailed in Mr. Acres' answers to contractors' evidence. As to the "main items of expense involved", it is not definitely understood whether these items are required under the headings of capital cost, operation, maintenance, etc., or under the headings of pumps, flumes, ditches, sumps, etc. The information under these headings is all contained in the records, and can be made available on further request, if necessary.

Question 13: When the work was commenced, were operations put in hand having definitely in mind a three-year period of construction. With the changed conditions necessary under the provisions of Estimate No. 2 for 10,000 second foot canal, were plans and operations so made that the work could be completed as then contemplated with the equipment therein stated to be necessary as at October, 1921? If so, with the actual output of the various items of plant, and comparing same with the output as estimated upon, do you now think that it would be possible to accomplish the work within the various periods had conditions remained the same as when the various estimates were submitted by you to the Commission?

Answer: The answer to both portions of this question is "Yes".

Toronto, July 23rd, 1923.

...in the future, however, it is necessary to maintain the same level of vigilance, and to be ready to take any further action which may be required.

[illegible]

The answer to both portions of this question is "Yes".

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